UNIVERSITY OF ALBERTA

RELATIONAL ETHICS IN PUBLIC HEALTH RISK COMMUNICATION

by

TIMOTHY W. LAMBERT

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And we cannot be wrong in supposing that this is derived from armed dances. For the elevation of oneself or anything else above the earth, or by the hands, we call shaking, παλλειυ, **or dancing.**

(Cratylus line 406d)

UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled **Relational Ethics in Public Health Risk Communication** submitted by **Timothy W. Lambert** in partial fulfillment of the requirements for the degree of **Doctor of Philosophy** in **Medical Sciences - Public Health Sciences**.

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ABSTRACT

My thesis addresses the issue of ethics in public health risk communication from the perspective of environmental health sciences. The thesis explores the practice of public health risk communication through the example of chemicals in the environment. The thesis uses for examples, tobacco smoke, alcohol, fruits and vegetables, and the pesticide toxaphene, a chemical introduced to the environment in 1950. The thesis addresses three hypotheses as an hermeneutic (i.e., interpretative) analysis: (1) there is a need for an ethical framework for environmental health risk communication as practiced by public health agencies; (2) there are analogies from bioethics and the development of the healthcare provider-person relationship which can be applied to the public health practice of environmental health risk communication; (3) for the specific practice of issuing health advisories by public health agencies, there is a balance between the "principles of bioethics" and the relational context. The "principles of bioethics" must be integrated into risk communication with such factors as causality, degree of uncertainty, variability, legal liability, and cultural diversity.

My thesis develops the practice of public health by considering the perspective of Socrates (470-399 BC.). Socrates was a *public benefactor,* communicating with the public in trying to learn. In the historical Socrates, I find the ethical principles of fostering autonomy, *the gadfly and midwife*, beneficence, *promote the good*, and non-maleficence, *do no harm*. It is argued that any practical ethical principle develops meaning when considered in the relational context. I develop the concepts of *science* and *risk* from Socrates' perspective.

My thesis explores the history of health risk communication through analysis of the *Canadian Journal of Public Health* over this century. After the method of Socrates, the thesis compares the risk communication ethical *desideria,* the values expressed by public health providers, and the deeds of public health practice with respect to chemicals

in the environment. I conclude that the *words* and the *deeds* are, in fact, not in harmony.

I propose a practical approach to health risk communication that develops the concepts of *health advisories*, public notification of benefits and harms, and *chess advisories*, public notification of the state of public health risk games. The model develops the concepts of risk assessment as *decision under ignorance*. The theoretical perspective, hazard identification and dose-response, is discussed in terms of the nine Hill Causal Criteria, and provides the spectacles through which to reflect upon exposure assessment.

DEDICATION

there would be no song fest
if just the best birds sang and not the rest

The thesis is dedicated to my family who taught me the birds' maxim: my parents, Willie and Pinky; my grandparents, Grandpa and Poppa, Granny and Mom; my heroes, Frank and Jerry; and my best friends, Laurie, John and Shawna

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I thank Robert Burch from the Department of Philosophy for helping with my thoughts on Socrates and reminding me of the potential for Sophistry and Andrew Light for helping with the initial chapters. I am grateful to Brian Smith for reminding me of the *hubris* in academic work. I am especially grateful for the work of my friend Joseph

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Introduction: Relational Ethics In Public Health Risk Communication

In this thesis, I address the need for ethics in public health risk communication in Canada. I provide a framework to discuss ethical questions about chemical contaminants in the environment. The thesis focuses on the dialogue between the public and public health practitioners concerning the presence of chemical contaminants in the environment that could negatively impact human health, and the potential for fruits and vegetables to positively impact human health.

Public health advisories for chemical exposures provide a practical view of the practice of public health risk communication. I specifically examine the communication concerning saxitoxin in fish, tobacco smoke and environmental tobacco smoke, alcohol, fruits and vegetables, and mercury and toxaphene, two chemical contaminants in fish. These cases provide a spectrum of chemical contaminants in diverse public health risk communication contexts.

The thesis is structured around three hypotheses (or propositions) with respect to the concepts of risk and ethics in public health:

1. There is a need for an ethical framework for environmental health risk communication as practiced by public health agencies.

2. There are analogies from bioethics and the development of the healthcare provider-person relationship which can be applied to the public health practice of environmental health risk communication.

3. For the specific practice of issuing health advisories by public health agencies, there is a balance of the "principles of bioethics" and the relational context. "Principles of bioethics" must be integrated into health risk communication with factors such as causality, degree of uncertainty, variability, legal liability and cultural diversity.

These three hypotheses were formulated jointly with my PhD supervisory committee. For clarification, there are four "principles of bioethics": beneficence - promote the good; non-maleficence - do no harm; respect for autonomy - respect for persons; and, justice - equity/fairness. My own intuitions about the principles of respect for autonomy, beneficence and non-maleficence are developed in the thesis. I do not understand the principle of justice in the bioethics literature, but for simplicity after John Rawls, justice means fairness, and after the ancient Greeks, justice means good measure.

The introduction is in three sections and shows the basic structure of the thesis and my development of the three propositions. There are three parts: background, method, and thesis contents together with an outline of the argument. After reading the introduction, any particular chapter can be thought of in the context of the thesis as a whole. From reading the introduction, I hope to show that hypothesis one is true, i.e., there is a need for ethics and an ethical framework for the practice of public health. I hope to arouse your interest in hypotheses two and three, and thereby convince the sceptic in you to read my thesis.

Background

The Problem

Pellegrino states that the problem we face today is one of overcoming cultural diversity, incommensurability in science and ethics, dealing with the Nietzschean (1844-1900) legacy: "For Nietzsche, the idea of one truth is an illusion: all we are capable of discussing, are multiple truths seen from many incommensurate perspectives" (Pellegrino 1993, p. 1162). Pellegrino suggests that we are facing a period of crisis in full capitulation to Nietzsche, deep nihilism and scepticism, denying the possibility of arriving at any truths.

Dialogue provides us with a way of approaching incommensurability, the problem of risk communication. In dialogue, when one person says something to another, the other person does not generally respond with exactly the same meaning (Bohm 1996). The first person speaking, if they listen, may then see a similarity and difference between what they meant to say and what the other person understood. Likewise, the other person speaking, when listening, may hear a similarity and difference. On considering this similarity and difference in meanings, people may be able to see something new which is relevant to both perspectives. Thus in the dialogue, going back and forth, new content may emerge that is "common" and provide some ground to move toward. Communication means "to make things common".

Luhmann (1993) states that the word "risk" first appears in the transitional period between the late Middle ages and the early modern era (~1500). There is an early usage in the context of communication: Scipio Ammirato writes that "whoever propagates rumours runs a risk (rischio) of being asked where he obtained his information" (Luhmann 1993, p. 10). The word risk appears in a variety of contexts and often in the fields of marine navigation and trade. However, the concept is much older, and interestingly, many translators of the ancient Greek writings use the word "risk". The ancient Greeks were very aware of the perils of sea travel, and in the *Hippocratic corpus*, physicians are compared with sea captains; everyone is a good captain in calm waters.

In the thesis, I develop risk communication as the dialogue concerning uncertain pain and pleasure, goods and harms; risk communication is dialogue on expectations and experiences. I consider the purpose of public health risk communication as the flow of meaning between the public and public health providers, the development of common knowledge on pain and pleasure, goods and harms.

Pellegrino suggests that what is needed is a comprehensive philosophical underpinning for medical ethics that will link the great moral traditions. The thesis develops this suggestion for public health ethics. I develop a theoretical framework from an historical perspective, in the sense that Pellegrino says: "none is, in my opinion, more important than the subjection of the entire corpus of medical ethics to serious philosophical inquiry" and "the solutions we seek to the practical problems of moral choice depend entirely on the conceptual framework we use to define what we think right or wrong, good and bad" (Pellegrino 1993, p. 1158).

Nietzsche (1887), in the *Genealogy of Morals*, provides us with an approach to our ethical crisis with his perspective on the "question of value" and its relation to public health:

> I would propose the following question, which deserves the attention of philologists, historians, and philosophers alike: What light does the science of linguistics, especially etymology, throw on the evolution of moral ideas?
>
> However, it would also be necessary to enlist the assistance of physiologists and medical men. This can be most fittingly accomplished by the professional philosophers, who as a body have shown a remarkable skill in the past of bringing about amicable and productive relations between philosophy, on the one hand, and physiology and medicine, on the other. It should be stressed that all tables of values, all moral injunctions, with which history and anthropology concern themselves, require first and foremost a physiological investigation and interpretation, and next a critique on the part of medical science.
>
> The question "What is this or that table of values really worth?" must be viewed under a variety of perspectives, for the question "valuable to what end?" is one of extraordinary complexity. For example, something obviously valuable in terms of the longest possible survival of a race (or of its best adaptation to a given climate, or of the preservation of its greatest numbers) would by no means have the same value if it were a question of developing a more powerful type. The welfare of the many and the welfare of the few are at radically opposite ends. To consider the former *a priori*, the higher value may be left to the naivete of English biologists.
>
> All sciences are now under the obligation to prepare the ground for the future task of the philosopher, which is to solve the problem of value, to determine the true hierarchy of values. (Nietzsche 1887, p. 188)

I take Nietzsche's question as providing insight into the "table of values" we are seeking in public health practice. Nietzsche's concern is with the "perspective" that gives meaning to value. Nietzsche (1887) says there is only a perspective seeing, perspective knowing; the more affects we allow to speak, communicating about things, the more complete will be our sense of "objectivity" about things. Nietzsche's question led me to ask about the public health perspective and seek the maxims of public health practice. I wanted to know: How has perspective influenced values in public health practice?

In Canadian public health practice, the seed values are "prevention" and the welfare of society as a whole, the "greatest good for the greatest number". Is this perspective naïve? Are we "English biologists", as Nietzsche suggests? What "value" is the public health perspective missing? Can a philosopher solve this problem and fix it once and for all?

Relational Ethics

The need for a thesis on ethics in public health risk communication in a department of public health sciences is a surprise. It demonstrates the meaning of uncertainty in our thoughts about things. It is part of a surprise in medicine, or perhaps society at large. Pellegrino says: "If there was anything that seemed impervious to the metamorphosis we felt all of medicine to be undergoing, it was its ancient ethical framework" (Pellegrino 1993, p. 1159). Pellegrino suggests it began in the 1960's, with the questioning of the "long quiescent period in which the Hippocratic tradition, enriched over centuries by contact with stoics and with religious traditions, was taken as a given" (Pellegrino 1993, p. 1158).

Principle-based ethics has been developed to provide guidance. The principles have come from the modern period and have been blended with the Hippocratic tradition. Bauman (1993) says: "Modern legislators and modern thinkers alike felt that morality, rather than being a 'natural trait' of human life, is something that needs to be designed and injected into human conduct" (p. 6) and further, that this led philosophers to prepare "ethical prescriptions" which compelled every human creature and legislators to formulate one set of rules, normative regulations, principles which everyone must follow.

Bauman says a source of our current ethical crisis is the belief in the possibility of an authoritative ethics of rules, thinking that "codes of practice" is all we need, that the good code is just around the corner. This leads us to trust in rules, to think of ethics as law. But where do we look for ethical guidance if not to rules?

Pellegrino says: "medical ethics holds more hope for a better grounding of principles, rules, virtues, and moral psychology, than any other field of ethics. That hope rests on the universality of the phenomena of illness and healing" and that "the four principle approach (of bioethics) can be preserved and even given lexical ordering if these principles are grounded in the realities of the physician-patient relationship" (Pellegrino 1993, p. 1162). My starting point in the thesis is the relationship between public health providers and the public. My basic intuition is that the principle of respect for autonomy needs to be thought of as "fostering autonomy". This principle I am seeking is grounded in the relationship between the two.

Hermeneutic of Public Health

The thesis is an hermeneutic (i.e., interpretative) analysis of the public health literature. In particular, I examine the writings in the *Canadian Journal of Public Health* over this century for examples of ethical approaches to risk communication, and the relationship between public health providers and the public. I also examine the writings of the ancient Greeks for approaches to the three hypotheses. The "principles of bioethics" that I develop are: fostering autonomy, i.e., being for people in helping them to think and care for themselves; beneficence, i.e., promoting the good; and non-maleficence, i.e., doing no harm.

My introduction to hermeneutics came in my undergraduate education, not in my major discipline, biochemistry, but from elective courses in religious studies, primarily Hebrew. Norris says hermeneutics "has to do with the inherent circularity of all understanding, or the fact that comprehension can come about only through a tacit knowledge that alerts us to salient features of the text which would otherwise escape notice. Yet it is also the case that every text (and every reading of it) in some way manages to pass beyond the 'horizon of intelligibility' that makes up the background of foregone interpretive assumptions" (Norris 1995, p. 353). The word comes from the name of Hermes, the messenger of the Greek Gods, which gave rise to hermeneuein, meaning, "to interpret".

In an hermeneutic sense, the thesis did not develop linearly, addressing the three hypotheses one at a time; the thesis is not structured sequentially with each hypothesis being isolated, following the other in a serial fashion. The three hypotheses are themes that inform the contents of the thesis. Each chapter was continually revisited, in particular Chapters 2, 3, and 4 were rewritten, as my understanding of the hypotheses, of the literature, and even of my own writing, developed. However, Chapter 1 was written before my reading about the ancient Greeks.

I address the three hypotheses for public health practice from an historical perspective, an eye on "public health in the rear view mirror". There is a sameness in the scientific, ethical, risk, and communication themes from the perspectives of ancient Greeks to the *Canadian Journal of Public Health*, even though they are from different times. I think of hermeneutics as studying this sameness and difference within the different times.

With respect to the Greeks, I examine the Socratic dialogues of Plato (428-347 B.C.) and Xenophon (428-354 B.C.), the *Hippocratic medical corpus*, Aristotle (384-322 B.C.) and the writings of the first Greek philosophers. In particular, Anaximander's perspective provides the seed of Socrates' approach (6th century B.C.) cf. (Kahn 1960, Heidegger 1975). I consider Socrates (470-399 B.C.) and Hippocrates of Cos (??-370 B.C.) to have sown the seeds of public health practice.

Chapter 2 was written after reading the *Hippocratic corpus* and Aristotle's *Nicomechian Ethics*. Chapters 3, 4 and 5 were written after reading many of the ancient Greeks, but most importantly the Socratic dialogues. I have resisted and have not changed Chapter 1 after reading the ancient Greeks.

In the thesis, I question the assertion that the "long quiescent period" to which we have just awoken is the tradition of "Hippocrates of Cos". Pellegrino says of ethics in the 1950s: "Medical ethics, was, as it had been for centuries, solely the domain of the profession" (Pellegrino 1993, p. 1158). Pellegrino says that Plato did not produce a treatise specifically devoted to the ethics of the physician. I part with Pellegrino on this point.

In keeping with Heidel (1941), I think that Hippocrates of Cos follows Socrates in his practice. The major difficulty with this position is that there is no clear discussion in the *Hippocratic corpus*, no explicit mentioning of "Socrates" in the essays. Further, we do not know what essays in the *Hippocratic corpus* Hippocrates of Cos actually wrote, if any. With Heidel, my argument rests on the writings in Plato's dialogues.

Socrates was Plato's master and, thus, Plato would not compare or have Socrates agree with just anyone. In the dialogues, Hippocrates of Cos appears, and Socrates respects Hippocrates of Cos; they are in agreement about practice (Phaedrus 271c). Unfortunately, Plato does not write a dialogue of the two masters. Plato states that Socrates' mother, Phaenarete, was a midwife, knowing the power of drugs, i.e., toxicology. Socrates says he develops his practice from her perspective and he calls himself a "midwife", delivering and supporting the growth of seeds. This is the root of Socrates' practice, namely, his relationship with his mother.

Socrates is introduced as a healthcare provider in the *Charmides* dialogue. He discusses the basic tenets of Greek medicine, and an ideal world of risk management.

Socrates' ideas of practice require his basic ethical attitude, knowing one's ignorance. Socrates' practice reflects ethical principles; Socrates does not devour Charmides when he sees him and is taken with the flame. Socrates, in the beginning of the dialogue, states that "he knows" the cure for headaches, a drug and a charm (Charmides line 155e). However, in the end, he can not determine if Charmides needs the charm. And, rather than treat Charmides rashly, Socrates hangs his head saying: "examine yourself and see if you can do without the charm, I would rather advise you to regard me simply as a fool who is never able to reason anything out" (Charmides line 175e). Socrates does not treat Charmides rashly, like a merchant of charms.

The *Protagoras* dialogue begins with a long conversation about risk between Socrates and Hippocrates the boy. The latter is seeking Protagoras, the famous Sophist, for his teacher. Socrates says: "if it were the case of putting your body in the hands of someone and risking the treatment turning out beneficial or reverse, you would ponder deeply. Suppose for instance you had it in mind to go to your namesake Hippocrates of Cos, what would you become?" To which Hippocrates the boy says: "A doctor" (311 c). Then Socrates asks: "But wouldn't a man like you be ashamed to face your fellow countrymen as a sophist?" Hippocrates the boy blushes: "If I am to speak my mind, I certainly should" (Protagoras line 312). Plato has Socrates respect Hippocrates of Cos by distinguishing him from sophists. Windelband (1899) says that one of the heaviest charges which Socrates, Plato and Aristotle raised about the sophists is that they converted science into a trade.

Socrates states that we must see that these sophists don't deceive us: "like those who deal in food for the body, these people do not know themselves which of the wares they offer is good or bad for the body, but in selling praise all alike, and those who buy from them don't know either, unless one of them happens to be a doctor. Likewise, they are ignorant of the harmful or beneficial effects on the mind of what they have for sale. If then, you chance be an expert in discerning which of them is good and bad, it is safe for you to buy knowledge from Protagoras or anyone else. Take care you don't gamble dangerously with all that is dearest to you. Indeed the risk you run in purchasing knowledge is much greater than buying provisions" (Protagoras line 313d). Socrates attempts to help Hippocrates the boy think about his decisions, helping him form images in his mind. We are looking for this expert in public health practice, the doctor of risk; who is the person who knows whether some food is good or bad for the body, whether some knowledge is good or bad for the mind?

Socrates was not a professor, but considers himself a seeker of knowledge in public spaces. Socrates notes that he had no regular pupils, and "he did not set up as any man's teacher" (Apology line 33). Socrates did not engage in private dealings, closed communication, or in using his services as bargaining chips. The open communication emphasized by Socrates is necessary for scientific and ethical practice. My conception of relational ethics develops from Socrates' "metaphor of the plant" to describe the public benefactor's relationship with people, as he explains to Euthyphro:

> Of all our political men, Evenus is the only one who seems to begin in the right way, with the cultivation of virtue in youth; he is a good farmer, and takes care of the shoots first, and clears away us who are the destroyers of them. That is the first step; he will afterwards attend to the elder branches; and if he goes as he has begun, he will be a very great public benefactor. (Euthyphro line 3, Jowett 1992)

Notice, Socrates wants protection for the shoots, he is promoting "do no harm". This is the principle of non-maleficence. Socrates wants people to be thinking for themselves and thus grow their own thoughts.

The hermeneutic approach is particularly important with respect to the Socratic writings. There is a great debate in academic circles on the question "Who is Socrates?" It is not my major concern in the thesis to construct the definitive Socrates, but it is an important question in the thesis for ethical public health practice. The problem is that Socrates did not write. The thesis is based on the Socratic dialogues of Xenophon and Plato, both of whom use Socrates' name for their main character. Indeed, Socrates asks us to consider "the use of his name" in Plato's first text, the *Apology*, detailing Socrates' defence at his trial.

Socrates suggests that his accusers' charges are like those found in "the comedy of Aristophanes *(Clouds)*, who has introduced a man whom he calls Socrates", who searches into things below the earth and in the sky, makes the worse appear the better cause, and teaches others to follow his example (Apology line 19c). Similarly, Socrates also argues that his name is being used by the oracle of Delphi which says: "no one is wiser than Socrates"; Socrates claims: "he is not speaking of Socrates, he is only using my name as illustration" (Apology line 23b). Thus, we face the paradox of how do we know what Socrates thought? Therefore, be careful reading the thesis that I do not put my Socrates in your mind.

Sceptical readers consider the Socratic writings to be pure fiction, a genre of literature. From this perspective, a person could entertain the idea that Plato's Socrates, the man who speaks and jokes with the principles of toxicology, "Socrates the healthcare provider" in the *Charmides* dialogue above, is a fictitious tale based on our famous historic medical man, Hippocrates of Cos. The sceptic could argue that Plato equates Socrates with Hippocrates of Cos, because Hippocrates of Cos has a "good" name. Thus, history will always think of Socrates as good, as wrongfully executed in minutes from the acute toxin, hemlock poison. The sceptic may argue that Western ethics has been duped from the start, thinking "there was a man as good as Socrates"; and further, that relational ethics is just phrases, an aesthetic cover-up to put us to sleep.

Others consider Plato's *Apology* as providing insight into Socrates' ideas, which he develops in further dialogues. Plato was present at Socrates' defence and thus would have heard Socrates' arguments for himself. In the beginning of the *Apology*, Socrates states: "If you hear me using the same words in my defence which I have been in the habit of using, and which most of you have heard in the public spaces, and at the tables of the money-changers, or anywhere else, I would ask you not to be surprised at this"

(Apology line 17d, a similar statement is made in the Phaedo dialogue, line 100b). In later dialogues, Plato writes about many of the themes that are present in Socrates' speech in the *Apology*. These themes are not apparent when first reading, but only emerge with each re-reading of the dialogues, after developing an awareness of the ideas.

Others still think that Plato had no thoughts of his own. The writings are all Socrates' ideas except for Plato's last thoughts, when he stops using Socrates' name in his dialogues. However, Plato's dialogues are conversations, which Plato did not necessarily hear, between Socrates and prominent Athenians. Thus the dialogues have to be considered fiction to some degree and require Plato's ideas. The dialogues are not necessarily what Socrates actually said (unless, of course, Plato had magnificent ears and could hear the words of all times!).

Xenophon's (428-354 B.C.) four Socratic dialogues also develop some of these same themes found in Plato's (429-347 B.C.) *Apology*. Xenophon probably had access to some of Plato's writings; he has two dialogues that have similar titles to Plato: *Socrates' Defence* and the *Dinner-Party*. However, independent of Plato, Xenophon provides a different perspective and develops the "metaphor of the plant" and the basic principles of toxicology through talking about alcohol. Xenophon discusses Socrates' ideas about care of the mind and the body.

Through Xenophon's writings, we can place Socrates and Hippocrates together at the battle of Delium (424 B.C.), where Athens faced serious defeat. In Xenophon's dialogues, Pericles says: "All this is true Socrates. But you can see that ever since the disasters suffered by Toulmides and the thousand at Lebadia, and by Hippocrates at Delium, the prestige of Athens has been low" (Xenophon, Memoirs of Socrates 3.5.1).

In Plato's writings about Delium, we catch a glimpse of Socrates' defence, his notions of risk and virtue. Socrates says in the *Apology*:

> Strange, indeed, would be my conduct, O men of Athens, if I who was ordered by the generals whom you chose to command me at Potidaea and Amphipolis and Delium, remained where they placed me, like any other

> man, facing death; if I say now, when as I conceive and imagine, God orders me to fulfil the philosophers' mission of searching into myself and other men, I were to desert my post now through fear of death; that would indeed be strange, and I might justly be arraigned in court for denying the existence of the gods, if I disobeyed the oracle because I was afraid of death: then I should be fancying that I was wise when I was not wise. (Apology line 28e)

In the *Laches* dialogue, Laches says: "He was my companion in the retreat from Delium, and I can tell you if others had only been like him, the honour of our country would have been upheld, and the great defeat never would have occurred" (Laches 181b). In the *Symposium*, Plato writes: "You should have seen him when we were in retreat from Delium. I happened to be in the cavalry, while he was serving the line. Our people were falling back in great disorder and he was retreating with Laches when I happened to catch sight of them. For one thing, he was so much cooler than Laches, and to borrow a line of yours Aristophanes (from *Clouds*, line 362), he was walking with the same 'lofty strut and sideways glance' that he goes about with here in Athens" (Symposium 221a).

The sceptic says the historical references in the Socratic writings are consistent and excellent fiction - a grand tale! Plato is a poetic genius. I consider that the references to Delium tell us that Socrates knew Hippocrates and further, in a context where they were facing risks together, facing people being beaten. There is a need for health care and risk communication in this scene at Delium where Socrates and Hippocrates are found. Socrates is cool, almost detached.

I show in the thesis that these fragments about Delium contain ideas that are relevant to Socrates' risk education method and the approach to hypothesis 3: public health providers exploring the line for people, helping people deliberate the risks, but importantly, there for people as they are risking, experiencing the line. Public health advisories are for people on the line, in the streets in the community. Thus, Socrates is a health risk communicator. Facing the death of Socrates, Simmias says: "And where shall we find a good charmer of our fears Socrates, when you are gone?" (Phaedo line 78). Indeed, Simmias' question is still relevant, and it is what I am seeking in the thesis.

Risking in Public Health Today

As a point of clarification, I do not believe that all we need to do is to read Plato and Xenophon, and that then our problems will be solved in ethics or science. The Greeks are from another time, and as Guthrie says, a thick screen of smoke stands between us. In the thesis, I try to develop the "good side" of Socrates, qualified in particular with respect to examples of slavery and the treatment of women. Further, current problems are much deeper and were not anticipated by the ancient Greeks. Just considering the science, from an historical perspective, the sphere of scientific knowledge can be seen as having a fleeting edge, as knowledge of chemicals, chemistry, biochemistry, genetics, toxicology and epidemiology, develops over 2,500 years and, in particular, over the past century. We are in the "risk culture", which means that we cannot see the future; the connection between our acts and their outcomes is separated too far in time and space and thus we must assign to our actions and thoughts a certain precarious probability (Dewey 1929, Bauman 1993).

We cannot say that we "caused" the "hole in the ozone layer", as if we deliberately presupposed this result of the chemical refrigerant, chlorofluorocarbons (CFCs). CFCs were thought to be safe; as Colborn et al. suggest, we gave the "Priestley Prize" in chemistry to Thomas Midgley in 1941 for developing their being. We were confident and full of hubris. We cannot say we caused the contamination of all the fish with the natural toxin mercury, as if we predicted this occurrence with risk assessment and persisted anyway. The contamination of the fish is part of our presence. This natural contaminant is the cause of the greatest number of fish health advisories issued in the U.S.A. at 1,306. We have only recently noticed our contribution in the process of bringing about mercury's presence in fish.

Toxaphene, the "man-made" pesticide, was sprayed in Canada but was also carried by the winds, natural atmospheric processes, to Canada from the more southern parts of America and Asia. The "local" spraying has contaminated the environment much more broadly than anyone anticipated. Toxaphene bio-accumulates in humans, farm animals, fish and wildlife. We now are facing health risks from exposure to toxaphene 20 to 30 years after its most abundant usage. We are seeing toxaphene in the environment only now, partially because we did not have the analytic techniques to notice its presence, despite releasing tons into the environment. We did not know where the tons of toxaphene went. Now, we do not know the health effects from its presence. We are ignorant.

On the other hand, consider the few deaths that result from the natural toxin saxitoxin, which accumulates in shellfish from ocean blooms in certain seasons. Is saxitoxin a chemical contaminant? The toxin is very potent and can kill a person within hours from just a couple of bites of shellfish. Almost all of the potential deaths from acute chemicals in shellfish are prevented through monitoring and communicating their presence during the season. Problematically, we cannot count all the pleasure and good as we gobble the shellfish down. However, when one person dies, we notice, there is pain! Is public health the cause? Should we think about blame, or simply say that sometimes this just happens?

We cannot take "full" responsibility for the results of our actions and inactions. We live in risky times. Anaximander distinguishes cause and blame, extracting the mythic components in developing his natural philosophy (Kahn 1960); life consumes life in an endless tumble and life is not to blame. Socrates develops the metaphor, developing the ethical self, questioning our responsibility in relationships within the environment in the here and now. As a public health provider, Socrates takes responsibility for the whole through his relationships with individuals, helping them care for themselves in facing the risks.

We must wait ignorantly for the future and educate ourselves to accept the uncertainty in the arrival of the ambiguous good and bad. The question is when do we say "cause" means the "guilty one", the one to "blame"? When and how do we take responsibility for the toxicants like mercury, toxaphene, or PCBs, that have contaminated the environment and creatures of all sorts through bio-accumulation? We cannot fix these problems through cleaning all the creatures! Likewise, how do we take responsibility for risks like tobacco, and for the culture of smoking? Is releasing a health advisory the extent of public health responsibility, such that then the public and the environment are on their own?

With respect to chemicals in the environment and risk, the historical perspective allows us to see that we have revised our probabilities with respect to tobacco smoke, fruits and vegetables, alcohol, dietary fat and toxaphene. Science advances by showing how the assumptions that underlie some of our most certain assertions lead to fallacious reasoning and to actions that harm the environment. How do we face our ignorance? What do we say on public health advisories?

Our most certain case to understand the causal relationships between chemicals is acute toxicants like saxitoxin. By analogy, we can make statements with respect to cancer and chemicals in tobacco. Tobacco health advisories contain the message "chemicals in tobacco cause cancer". This causal relationship between chemicals in tobacco and cancer has been abstracted from the contingencies of real life, factors which contribute to the processes of the relationship between chemicals and cancer. The particular contingencies within people and the environment differentiate people's response to chemicals. Contingent factors make it difficult to say if a particular person will develop cancer from the chemicals in tobacco products. In contrast, saxitoxin is so potent that virtually everyone responds in the same way, and the causal relationship is less contingent upon the particular individual characteristics.

Public health thinking has changed in this century from smoking as a contingent factor to smoking as a causal factor, with respect to cancer. When public health providers saw people smoking with lip cancer, when did these two seemingly unconnected facts of matter, these two things on men's faces, become relevant causally and not there by chance? How do the probability calculations of risk dissolve? How does our perspective shift, from seeing chemicals present by chance to being causally related to things?

Since the publication of Doll and Peto's (1981) *The Causes of Cancer* there has been a substantial amount of concern that diet causes most cancers. Doll and Peto (1981) suggest that diet causes from 10 to 70 percent of all cancers. Dietary fat was considered a major concern. Many people are also concerned about chemicals in the diet and in the environment causing cancer.

Ames et al. (1987, 1990) says we should be more concerned with the carcinogenic potential from "natural" chemicals than from "man-made" chemicals; dietary pesticides are 99% natural. Likewise, Safe (1995) says xenoestrogens of natural origin are of greater concern than the "man-made" industrial chemical contaminants, like toxaphene, or DDT, based on his "mass balance" exposure assessment of xenoestrogens.

The fear from the "man-made" chemicals like DDT and toxaphene is primarily related to their ability to mimic hormones, in particular estrogen, associated with health conditions like cancer and birth defects. Thus they are called xenoestrogens. The concerns about xenoestrogens have been popularized in the book *Our Stolen Future* (Colborn et al. 1996).

Kavlock et al. (1997), in the review of the research needs for these chemicals, says that there has been a general increase in the incidence of cancer rates for hormone-sensitive tissues: female breast 24%, ovarian 4%, testicular 41%, and prostate 1,265% (Kavlock et al. 1996). In Canada, Durkan, in his article in the *Calgary Sun*, "Cancer to claim deadly toll", states that, based on Statistics Canada, the most frequent new diagnosis will be breast cancer; 1 in 9 women will develop this disease, and 1 in 25 are expected to die from it. For men, prostate cancer will be the most frequent diagnosis, with 16,100 cases this year; 1 in 8 will develop prostate cancer this year, and 1 in 26 will die from it (Durkan 1998). In general, it is predicted that 129,200 adult Canadians will be diagnosed with cancer, and 67,200 will die from cancer before the end of 1998; about 1,100 additional cases will occur in children, 0 - 14 years of age. Most people, ~74% of both incidence and mortality, will be over 60 years of age.

The Centers for Disease Control and Prevention stated that "the rate of boys born with a defect in which the urinary opening is misplaced on the penis nearly doubled (40 to 79 per 100,000; a total of 49,162 cases of hypospadias in 736,000 births), in the United States between 1970 and 1993". The increase has been observed in Denmark, England, Hungary, Norway and Sweden in the 1970s and 1980s. The researchers think that the defect is related to an insufficient surge of testosterone, the key hormone in the development of the male reproductive system. Scientists have been trying to link the increase to the hormone progestin taken by mothers, but say that the increase is too large to be accounted for by this risk factor. The Centers for Disease Control and Prevention state: "We felt it was worth getting this information out, in spite of the fact we could not explain the increase" (Associated Press 1997, p. D3). What is causing the increase in male birth defects and the incidence of hormonal cancers? Is there a general relationship, an underlying cause that can be abstracted from these experiences?

Safe (1995) points out that man-made chemicals act as both xenoestrogens, for example, DDT and related compounds, and antiestrogens, inhibitors of estrogen expression, for example dioxins and PCBs. With respect to their activity, Safe (1995) points out that "the estrogenic activities of different structural classes of industrial chemicals were reported by several research groups in the late 1960s and 1970s, like o,p'-DDT and other diphenylmethane analogs" (Safe 1995, p. 347). Estrogen has been discussed as a causative agent in cancer dating back to the 1930s (Randal 1979).

Ironically, the contamination of the environment with "man-made" pesticides is the result of our good intentions, of our trying to provide a steady supply of fruits and vegetables. This action is grounded in the belief that fruits and vegetables are good for us. If Ames and Safe are correct, we have contaminated the environment with "man-made" pesticides for the sake of fruits and vegetables, about which we also need to be concerned! The Environmental Protection Agency (E.P.A.) says: "Children can experience higher exposures to pesticides than adults because they eat larger amounts of fruits and vegetables for their size" (E.P.A. 1997, Volume 1, p. 9).

However, Spears, in the *Edmonton Journal,* says: "A two-year study commissioned by the Canadian Cancer Society and the National Cancer Institute found 70 to 75 percent of the fruits and vegetables sold in Canada have no detectable pesticide ("man-made") residue" (Spears 1997). The natural pesticide content of the fruits and vegetables was not measured. Spears, and the Canadian Cancer Society, erroneously conclude that we therefore do not need to worry about "man-made" pesticides because they are not present in the fruits and vegetables.

Exposure to man-made pesticides and xenoestrogens in the diet is from consumption of dietary fat, dairy products, human breast milk, and from the flesh of all the beasts. It is for these foods that there is a need for public health advisories for the "man-made" pesticides. Thus, our entire diet is suspect, with natural pesticides in fruits and vegetables, and man-made pesticides in human breast milk, in animals, in fish and in dairy products. What can we say is safe to eat in the public health advisories? How do we approach this uncertainty?

Our problem is not only scientific, but cultural; culture informs our thinking on the question "What is risk?" and what we think about the distinction between "man-made" and "natural". Insight into our cultural risk dilemma can be gleaned by considering the development of decision theory from Socrates' arguments about existence and "Pascal's wager".

Socrates argues that birth and death are two points on a circle, and in existence, we simply go round and round maintaining our relative autonomy: "If generation were a straight line only, and there were no compensation or circle in nature, no turn or return into one another, then you know all things would at last pass into the same state. If all things partook of life were to die and after they were dead remained in the form of death, and did not come to life again, all at last would die and nothing would be alive" (Phaedo line 72b). However, for Socrates, those who live the "good life" are somehow rewarded when they die. There is then a risk in life, namely, choosing whether to live the good life.

Modern decision theory develops from a similar risk presented by Blaise Pascal called "Pascal's Wager" (Pascal 1972). Pascal says that we are rewarded for living the good life through the Western God. Pascal's Wager can be presented through a simple two by two decision table, shown here with a fundamentalist spin, to help us with our own risk in life:

Options	Returns To Chooser God Exists	Returns To Chooser God doesn't exist
Bet On God	infinite reward	0
Bet Against God	burn in hell	0

Risk is about gambling and we are presented with the gamble of living unreflective lives; when we die then we pay. Notice, there is no value in a universe without God, i.e., life is meaningless. Therefore, based on the decision table, to receive reward in life, the rational choice is to "bet on God" and live the "good life" accordingly. If you do not bet on God, you will burn in hell. However, Pascal's wager has been seriously challenged because the underpinnings of the decision table are very questionable. Bursztajn et al. (1981) discuss the use of decision theory in health care and state that decision theory produces nice clean answers with seemingly clear solutions. However, the problem is that people believe they are certain.

In modern epidemiology, the risk from chemical contaminants can be presented with a two by two table, or a contingency table. From the table, the relative risk (RR), attributable risk (AR) and the odds ratio can be calculated. The contingency table is:

	Disease	No Disease	Incidence
Exposure to Chemical	A	B	A/A+B
No Exposure	C	D	C/C+D

A: the number of people exposed to chemical with disease

B: the number of people exposed to chemical without disease

C: the number of people not exposed to chemical with disease

D: the number of people not exposed to chemical without the disease

The relative risk (RR) of disease if exposed to a chemical is defined as the incidence in those people exposed divided by the incidence in those not exposed:

RR = A/A+C **divided by** C/C+D

The attributable risk (AR) of disease is defined as the incidence in those people exposed minus the incidence in those not exposed to the chemical:

AR= A/A+C **minus** C/C+D

These two conceptions of risk answer different questions (Hill 1971). Relative risk is a unitless number and is useful in answering questions about the etiology of disease. The magnitude of the relative risk gives information about the strength of the relationship between exposure to the chemical and disease. Large relative risks suggest a "one to one" causal relationship.

The attributable risk presents the actual difference in the rate of disease between those exposed and those nonexposed in a particular study. The attributable risk provides information on how many extra deaths or disease events will occur from exposure to a chemical. This indicates the amount of disease attributable to a particular exposure. The problem arises when epidemiological studies investigating the same chemical exposure reach different conclusions. How do we decide what to believe? Is there such a thing as absolute risk?

The framing of our problems and their manner of presentation, influence the way in which we think about things, make our choices, and act in the world. This problem for risk communication has been demonstrated in health care; presenting risk information in terms of living or dying, good or bad, profoundly affects the decisions people make (McNeil et al. 1982, Mazur et al. 1993). The framing of our problems is cultural. Can we ever escape from the culture in which we exist: scientific, Canadian, western?

This is the risk communication problem we face with respect to chemicals in the environment and risk assessments; in telling people to believe us, that we know what is safe to eat, that we have formulated a good table. Have we found the risk doctor that Socrates speaks of to Hippocrates the boy; the doctor who knows the good and the bad in foods, the good and bad in knowledge?

Perera and Boffetta (1988) suggest that the Ames et al. (1987) approach which leads to their belief, and many others, that "man-made" environmental pollutants such as pesticide residues and contaminants in drinking water is "likely to be of minimal carcinogenic hazard" relative to the background of natural chemicals found in the diet, has inherent flaws that derive from the selection of chemicals and exposure calculations in the analysis. They stress that "regulatory agencies would be unwise to base public health policies principally on comparisons such as these" (Perera and Boffetta 1988, p. 1,287).

In contrast to Safe (1995), Adlercreutz (1995) (to cite just one paper) presents the hypothesis that "phytoestrogens", the xenoestrogens in fruits and vegetables, protect against cancer based on epidemiological studies of vegetarians. Both Safe's and Aldercreutz's papers appear in the same journal, *Environmental Health Perspectives*, in 1995.

More recently, Ashby et al. in *Environmental Health Perspectives* say: "There are no data to support the assumption that synthetic chemicals, as opposed to naturally occurring chemicals (and in the case of humans' dietary constituents, lifestyles, etc) are the most important etiological contribution to the projected problem. A similar assumption, now considered to be incorrect (Ames and Gold 1990) was made in the early stages of the study of environmental carcinogenesis" (Ashby et al. 1995, p. 164). What do we do in the face of this uncertainty?

Should we bet on Ames and Safe and avoid eating fruits and vegetables because of the natural toxins, carcinogens and xenoestrogens, and forget about the "man-made" environmental contamination? "Fear the natural chemicals in fruits and vegetables and do not worry about man-made chemicals." Should this be the message on public health advisories? What should we do while we wait for the arrival of the "scientific facts" to answer our questions on xenoestrogens, and until regular relationships can be abstracted as causal laws? What should we tell people to eat through public health advisories? Should we tell the public anything?

Our problem is that generally the ground for all our claims turns out to be muddy waters within a couple of years. We have not finished our research and the quest for certainty continues... Who would have thought, as Anaximander and Socrates had thought, that the earth was not a sphere held still, in equilibrium at the centre of the universe? Who would have thought that we would need public health advisories for the presence of the "natural" toxin, mercury, for the "man-made" toxicant, toxaphene, in fish and for the presence of fish in the waters? Rescue comes only when danger is recognized. Whose responsibility is it to see the danger and tell the public?

Methodology

How does one address hypotheses about ethics in a dissertation in the Department of Public Health Sciences, from an "environmental health" perspective? Following the discussion in science I ask: Are the three hypotheses falsified or verified? Do we have tests for questions of risk and ethics that can be falsified or verified? What is the test that determines if there is ethics (i.e., the test that there is a need for an ethical framework, a table to sit around and communicate our values)? Can the sum total of pain and pleasure from chemicals, experienced by animals in scientific experiments, or in communities, be reduced to facts of matter and measured? Can this measure provide us with an objective indication of the ethical weight of an action or an ethical principle? I have not found these tests.

To answer my questions about ethics in public health practice, health risk communication and health advisories, I follow the advice of Socrates. Socrates distinguishes the ethical question by asking himself about responsibility in the here and now: "A man who is good for anything ought not to calculate the chance of living and dying; he ought to consider whether in doing anything he is doing right or wrong - acting on the part of a good man or of a bad man" (Apology line 28c). Problematically, consideration of right and wrong does not presuppose that nice clear answers can be found; tragedy and comedy are inescapable.

In seeking an ethical health risk communicator, Socrates suggests that we hear the risk advisor give an accounting of their words and deeds, and look to see if the words and deeds are in harmony. This is Socrates' defence in the *Apology* against the claim that he made the weaker argument the stronger and that he taught people to follow his example.

In the thesis, I examine the words of health communication over the century in the *Canadian Journal of Public Health* and consider these ethical *desideria*. Ethical *desideria* are values that inform public health risk communication and the relationship with the public. The ethical *desideria* provide the seeds of my approach to hypotheses 2 and 3.

I contrast the words with the deeds of public health practitioners, over approximately the same time frame, as recorded in the *Canadian Journal of Public Health* with respect to health risk communication about chemicals in the environment. Specifically, I examine the deeds surrounding tobacco, fruits and vegetables, alcohol, mercury and pesticides (in particular DDT and toxaphene).

Although the *Canadian Journal of Public Health* is not the primary source for many revelations in public health or for the scientific literature as a whole, my focus is on Canada. Nonetheless, it is reasonable to expect that the major public health revelations from around the world would emerge in the journal. But to compensate for this limitation and to document the emergence of scientific information, I complement the journal with information about the risks from chemicals in the environment.

The sequence of scientific insights and their subsequent discussion in the journal provide insight into the dialogue amongst public health providers and the movement of thought in public health practice. These thoughts inform the decision to issue an health advisory, to initiate communication with the public, and provide both the substance of the advisory and the rationale supporting the words used in it.

In studying the *Canadian Journal of Public Health*, I had read through each issue in the library from approximately 1929, over and over again, looking for papers discussing ethics and chemical risks. There are many papers in the journal that I do not discuss, but I tried to find every paper on ethics and health education, cancer, tobacco products, fruits and vegetables, and pesticides. I asked how public health has dealt with these chemical risks. Do the words inform public health risk communication and the development of health advisories? Is there any value in words, ethical *desideria*, other than comparing them to deeds? Thus, the thesis as a whole addresses hypothesis 1: there is a need for an ethically grounded framework for public health risk communication.

Hypotheses 2 and 3, and the development of health advisories, develop from Socrates' scientific and risk communication approaches along with current ideas in the *Canadian Journal of Public Health* and the recent bioethics literature. The theoretical framework to approach health advisories in hypotheses 2 and 3 refers to the title of the thesis, focussing on relational ethics.

Thesis Contents and Overview of the Arguments

Chapters 1 and 2 follow the thread of the three hypotheses and have a similar structure. Each chapter begins with the need for an ethical framework in public health risk communication and then discusses the recent concepts of bioethics, principle-based and relational ethics. The chapters conclude with a discussion of public health relationships and health risk communication; this discussion provides the theoretical perspective for the development and promulgation of health advisories. The contents of these two chapters continually inform and emerge in the rest of the thesis. The approach taken in each of these two chapters is indicated below.

Chapter 1 presents the ethical dilemma of health risk communication for chemicals in the environment through the case of toxicants in fish. The health risk communication for toxicants in fish covers a spectrum from acute exposures where a person may immediately die, like doses of saxitoxin in shellfish, to low doses of pesticides, like toxaphene, that have bio-accumulated in fish over the last fifty years. These extremes describe the different relational contexts in public health and present the different needs of the public. The ethical tension is between waking people up to the risks versus putting people to sleep.

In Chapter 1, I present the current thinking about ethics in the health risk communication literature. In particular, it should be noted that the word "ethics" does not appear in Health Canada's (1996) *Health Risk Communication Handbook*. Similarly, the *Maxcy-Rosenau-Last* (Last 1992) editions of *Public Health and Preventive Medicine* do not discuss the question of ethics in health risk communication, but do introduce concepts in bioethics. The public health literature emphasizes that a concept of informed consent is required for public health practice.

Chapter 1 introduces the concepts of Beauchamp and Childress' (1994) principle-based bioethics and the general concept of relational ethics. There are four principles of principle-based bioethics: the principle of respect for autonomy, the principle of beneficence, the principle of non-maleficence and the principle of justice. Chapter 1 concludes with ethical *desideria* from the *Canadian Journal of Public Health* over the century, as the values that inform public health risk communication. These words come from the literature on health education and provide intuitions from public health practice about relationships with the public and health risk communication that approach hypothesis 3.

The ethical dilemma posed by chemicals in the environment is continued in Chapter 2. I introduce the problems facing public heath risk communication by presenting the emergence of concerns about chemicals over the century: air pollution 1952, cigarettes 1963, asbestos 1975, and lead 1980 (Bates 1994). The ethical and material problems that public health faces from these chemicals were not foreseen. This unforseen character of the (new) risks places a serious limitation on an ethical system that relies on an accounting of goods and harms before acting. The "ethical dilemma" is not necessarily between choices, the high or the load road, but in facing our ignorance and uncertainty, the reality that we cannot see where either road leads.

The discussion of bioethics is continued in Chapter 2 with a critique of Beauchamp and Childress (1994) and, in particular, with the concepts of Bauman (1993), Gadow (1995), and Aristotle's (1941) *Nicomachean Ethics*. I develop the concept of "Relational Ethics" from the healthcare provider - person relationship by extending the deontological concept of Kant (1724-1804) (1785), the "categorical imperative", and the concept of informed consent, placing them within the context of public health relationships. Kant's concept of autonomy develops from Socrates' public activity of helping people "think for themselves" cf. (Kant 1784). While the imperative provides a starting point for deliberation, we do not exist in isolation as atoms but within an environment. Therefore, we need to consider how we are shaped by others, and how we need others to help us formulate our imperatives and reach decisions. We need to consider fostering autonomy as a process.

Along these lines, the concept of informed consent is discussed as both an "act" and a "process". The "act" refers to the legal requirements, the signing of official documents. The "process" refers to the health risk communication needed to take place between the healthcare providers and the public. This discussion provides the theoretical basis to approach the development of health advisories in hypothesis 3.

The root concept of relational ethics came in the form of the "double process" of Plato's medical model (Emanuel and Emanuel 1992). Emanuel and Emanuel (1992) conceive of autonomy as moral self-development and argue that this should be the model for health care. They compare four models of healthcare relationships and argue that the prototype of their healthcare provider is the caring provider, teacher or friend, which is characterized by Plato's deliberative model or "double process" from the *Laws* dialogue. This re-opens the door to the ancient Greeks and in particular, the study of Socrates. The synchronous emergence of the ancient Greeks, Hippocrates and Socrates, in the recent health literature brought up the whole question of "how we got here?". What was so wrong about Hippocrates and right about Socrates? Why did the Hippocratic model survive?

In Chapter 3 and Chapter 4, I approach hypothesis 3 most directly: "For the specific practice of health advisories issued by public health agencies, there is a balance of the principles of bioethics and the relational context". I speculate that this hypothesis describes Socrates' basic approach to health risk communication and that Socrates' risk communication activities are shaped by the relational context. In Socrates, I find the three ethical principles, namely, fostering autonomy, beneficence, and non-maleficence, and postulate that Socrates expresses them as the root of ethical public health risk communication.

The scientific approach for the examination of public health risks from chemicals is developed in Chapter 3, and merges the scientific attitude of Socrates with that of modern science, in particular, John Dewey's (1929) *Quest for Certainty* and the writings of David Bohm. Dewey traces the quest for certainty from the ancient Greeks to Heisenberg's uncertainty principle. Bohm's scientific writings extensively refer to the ancient Greeks and he develops his "process of becoming" in their basic dispositions.

From Bohm (1957), causal relationships are categorized as "one to one", "many to one", "one to many" and "many to many". Further, I contend that the fundamental principles of toxicology and the concepts of uncertainty and variability are derived from Plato's and Xenophon's writings about Socrates. I extend Socrates' concepts as a basic approach to risk assessment for chemical contaminants, following the Environmental Protection Agency (E.P.A.) (1997) *Health Risk Assessment Guidelines*, and ideas adopted from Bates (1994) *Environmental Health Risks and Public Policy*, Timbrell (1989) *Introduction to Toxicology*, Bursztajn et al. (1980) *Medical Choices - Medical Chances*, Rothman (1988) *Causal Inference*, and Hill (1971) *The Principles of Statistics*.

In Chapter 3, I analyze health risk communication for saxitoxin, tobacco smoke, alcohol, fruits and vegetables and contaminants in the environment, in particular toxaphene, a pesticide. I discuss the principle approach to health risk communication for the spectrum of chemical risks with respect to the causal relationships. The scientific and ethical certainty decreases as we move from "one to one" to "many to many" causal relationships.

The importance of public health relationships and the ability of health advisories to meet the communication needs are discussed along this spectrum. As the uncertainty in the causal relationship increases, there is a need to consider the tension between the "right to know" and the right to say "I've heard enough for now"; the tension of rights can be approached through relationships with the public. However, I run a risk with this scheme, for as Nietzsche suggests: "morality behind the great captious web of causality is hubris" (Nietzsche 1887, p. 113).

The historical analysis of chemical risks allows for a comparison of the ethical *desideria* in Chapter 1 with public health risk communication deeds in the *Canadian Journal of Public Health*. It is shown that the words and deeds are, in fact, not in harmony.

I present a variety of scientific perspectives on the scientific information for fruits and vegetables, following the framework developed by Hill: the Hill Causal Criteria (Hill 1971). The analysis discusses the epidemiological evidence and the underlying mechanistic explanation as a "many to many" causal relationship. Epidemiological studies suggest that fruits and vegetables appear to prevent cancers of all kinds, including lung cancer. Public health providers should communicate to the public that eating fruits and vegetables is a good risk to take and amounts to betting on natural chemicals in fruits and vegetables to prevent cancer.

The link between tobacco smoke and alcohol with cancer is presumed as a given by Hoffman (1937) in his book *Diet and Cancer*. This book was reviewed in the *Canadian Journal of Public Health*, but the link between cancer and tobacco smoke was not discussed. In his review, Hoffman cites Richard Mitchell, in 1879, as connecting cancer of the lip with smoking habits. Hoffman cites his own book of 1915, *The Mortality from Cancer Throughout the World*, saying:

> But with reference to the relation of cancer of the buccal cavity, and particularly of the lip, to smoking habits, considered in the German Cancer Census of 1902, I say:
>
> > The conclusion is advanced that the greater frequency of cancer of the lip among men is directly attributable to the smoking habit, and the evidence of tobacco misuse was apparently established in nearly 16% of the male cancer cases. It is pointed out, however, that the habit of smoking is not to be considered a direct causative factor, but only in the sense of being a contributory one, in identically the same way as it is held that alcoholism requires to be considered a contributory instead of a direct cause in cancer frequency.
>
> In another part of the same work, I make the statement that "The available statistical data would seem to indicate that both alcohol and smoking are directly contributory factors, to a variable degree and particularly so as regards certain organs or parts of the body". (Hoffman 1937, p. 488)

Hoffman then states the later findings from his 1931 studies of tobacco and alcohol, identifying environmental tobacco smoke. Notice that Hoffman speaks of the contingencies that make it difficult to attribute alcohol and tobacco as causes; causes must be abstracted from the contingencies as a regular relationship. Cancer is not being thought of as a "one to one" causal relationship, where each factor is necessarily the only cause. Hoffman concludes his section on tobacco by saying: "It would carry me too far to further review the literature on the subject so I will now proceed to discuss certain facts in the light of my own study of cancer in relation to diet and contributory factors" (Hoffman 1937, p. 489). Indeed, Hoffman moves on in his studies of cancer, from tobacco and alcohol to diet in 1937.

MacDonald (1998), in the *Edmonton Journal*, "Hitler an early anti-smoker", discusses the results of a new book, *The Nazi War on Cancer* by Robert Proctor (to be published later this year). The book apparently claims that the Nazi scientists, led by Dr. Karl Astell at Jena University, discovered the lung cancer-tobacco link in 1941, and an aggressive anti-smoking campaign for the German people began (MacDonald 1998). The chances that the link between smoking and lung cancer was a result of a fluke in statistics was 1 in 10 million. Note that this occurred four years after the publication of Hoffman's book, *Diet and Cancer*. MacDonald ends the article saying, Astell killed himself and his fellow scientists in 1945, after which "the Americans arrived with their chewing gum, silk stockings, and 93,000 tons of tobacco to be dispersed."

Evidence that tobacco smoke causes cancer was present from as early as 1929 in the *Canadian Journal of Public Health*. Then, surprisingly, it was not mentioned or discussed again from 1934 until the late 1950s, despite evidence that lung cancer mortality was increasing in Canada in 1949. In fact, public health risk communication about tobacco did not begin until 1964 in Canada, when the tobacco link with cancer was officially accepted and health advisories were issued (Defries 1964).

With respect to public health risk communication on alcohol, a person could argue that Canadian public health history is presently repeating itself. The United States issued an health advisory on alcohol products for birth defects in 1989, yet Canada does not have any such health advisory, almost 10 years later. Plato, 2,500 years ago, warned that alcohol causes both mental and physical birth defects. Doll and Peto (1981), in *The Causes of Cancer*, consider alcohol their second most important carcinogenic chemical after tobacco.

The link between alcohol and breast cancer was found in an epidemiological study of 90,000 nurses (Colditz 1993). Now scientists say, at the Harvard School of Public Health, alcohol, one drink a day, "causes" a 25% increase in the risk of breast cancer (Harvard Report 1996). Importantly, the hypothesis that dietary fat is the cause of breast cancer has not been substantiated.

Durkan (1988), in his article "Cancer to claim deadly toll", does not discuss the link between alcohol and the incidence of breast cancer. Ironically, on the very same page reads the headline about the British scientists' response to the Canadian and U.S. scientists' publication of their tomoxifen study, which they claim cuts breast cancer incidence risk in half: "New drug hopes: Results are Questioned". Why is there no news about alcohol and breast cancer from Canadian scientists?

Interestingly, it is hypothesized that alcohol acts through an estrogen mechanism. Safe (1995) does not discuss the relationship of alcohol to breast cancer and only stresses that "man-made" xenoestrogens are not a problem in breast cancer. Perhaps Safe does not discuss alcohol because it is neither natural or man-made; alcohol comes from the Gods. How do we escape from our cultural perspectives that causes us to see the way we do? When should public health in Canada begin discussing the link between alcohol and breast cancer? When should public health advisories for alcohol and cancer in general, and birth defects in particular, be released in Canada?

The environmental health concerns for toxaphene, bio-accumulation in wildlife, fish and humans, were anticipated in the *Canadian Journal of Public Health* almost 40 years before the problems emerged in the public health risk communication with the public (Kay 1950). The toxicity of toxaphene and chlordane was considered greater than DDT. The accumulation of these chemicals in humans is discussed throughout the years in the journal, documenting the evidence predicted in 1950. Considering the historical evidence dating back to the 1950s, and that we knew that these chemicals were xenoestrogens in the 1960s (Safe 1995), these chemicals were knowingly released to the environment in huge quantities. Where is the prevention?

This story in Canadian public health practice is confusing. It suggests that there is a need for an ethical framework. The communication problems for xenoestrogen contaminants is very complex because the health risks are not known and cannot be clearly articulated. There is a need to balance the principles of beneficence and non-maleficence, the "right to know" and the "right to say I've heard enough for now". We need to foster autonomy such that people can say "I've heard enough for now!"

However, we need to ask if these problems in public health practice are simply the result of the reliability of scientific judgement, or are there other values in public health practice? In the newspaper article, "Hitler an early anti-smoker", Sir Richard Doll says: "It is reasonable to say that had people been aware, it is quite likely that we could have started our research immediately after the war", but he added, "this would not change the fact that there are the same forces not wanting to accept the link" (MacDonald 1998, p. A2). Who did not want to accept the smoking and lung cancer link? Are there "forces" in Canadian public health practice? What are these forces?

Ironically, the Nazis had the first public health risk communication program to help people deliberate the risks of smoking, and smoking was banned in trams and public spaces in the state of Thuringen. MacDonald says a telegram from Hitler reads: "I congratulate those working to free humanity from one of its most dangerous poisons" (MacDonald 1998, p. A2). Can it be that the greatest preventative public health measure comes from those considered to practice the greatest evil? Should we look to the Nazis, to see if we can pluck the good from their practice, to guide public health risk communication?

Indeed, the Nazis were good communicators. Think of Leni Reifenstahl's developments in movie technology with her 1934 film *Triumph of the Will*; should this film be the model for public health risk communication? The emergence of bioethics was prompted most dramatically by the practice of doctors conforming to the norms of Nazi Germany rather than some deeper humanistic enterprise (Burt 1996, Dunstan 1987). How do we answer the question: When does persuasion become manipulation, and manipulation become coercion, in public health risk communication? This is the question for public health risk communication. The seed of the answer is in the ethical attitude of Socrates, presented in Chapter 4.

Plato and Xenophon say that all of the children wanted to follow Socrates, wanting to learn from Socrates; Socrates motivated people to want to learn. However, in the dialogues, Socrates insists that he has never set himself up as anyone's teacher. He did not want people following him. What does this mean? In the *Phaedo* dialogue, on the day of his execution, we see Socrates' ethical attitude which gives his assertion some meaning and helps to answer our question.

In the *Phaedo*, Socrates is discussing the various probabilities of existence with Cebes and Simmias, as we saw above in the background section. However, he is careful to say to Simmias and Cebes (because he knows he is going to be killed and that everyone wants to believe that there is more than just his death to come) that: "I would ask you to be thinking of the truth and not of Socrates: agree with me, if I seem to you to be speaking the truth; or if not, withstand me might and main, that I may not deceive you as well as myself, in my enthusiasm, and like the bee leave my sting in you before I die" (Phaedo line 91c).

Socrates saw himself as the "gadfly": "All day long and in all places, I am always arousing and persuading and reproaching everyone of you. I dare say that you may feel irritated at being suddenly awakened when you are caught napping" (Apology line 31). Socrates wants persuasion which requires people to be thinking for themselves. However, he guards against risking manipulation, people thinking his thoughts, polarized by his magnetism; Socrates does not want to cause harm, or psychological coercion with his sting. Socrates is just a gadfly who wakes people up to their ignorance. But also from the background section, Socrates says he is a midwife, after his mother; Socrates helps to deliver people's own thoughts.

Socrates is fostering autonomy as the midwife and gadfly. Socrates wants everyone to think for themselves, form their own images in their minds and actively choose, making decisions here and now. Fostering autonomy is providing the environment for people to think about their lives, and to care about their minds and bodies.

Socrates' approach is developed by considering his relationships primarily in five of Plato's dialogues. First, the *Phaedo* dialogue introduces Socrates' risk perspectives: the mind's eye and the eye on the road. Second, the *Charmides* dialogue presents Socrates as a healthcare provider, and develops the principles of Greek medicine, consideration of the whole, analogous to the *Hippocratic corpus*. Third, the *Protagoras* dialogue presents Socrates as a risk advisor in communication with Hippocrates the boy. Socrates and Protagoras discuss the attitude that makes for a good teacher. They ask about our major assumption from Pellegrino and Bauman: Do we need rules, or will ethics emerge naturally in our face to face relationships? Socrates' conception of risk and the risk education method are presented by considering the *Laches* dialogue. I consider the development of the *Laches* in Plato's *Allegory of the Cave, Republic* VII. Aspects of this dialogue bring together Socrates' perspectives in the *Phaedo* and complete the concept of risk begun in the *Laches*.

In Chapter 5, I develop a framework for decisions under ignorance that can be applied to the development of *health advisories* and *chess advisories*, public notification of the state of public health risk games. I hope the framework potentially mitigates the problems encountered over the century in health risk communication. The framework develops Bates' (1994) ideas about public health practice, with Rawls' (1957) "An Outline of a Decision Procedure for Ethics" and the concept of relational ethics. The framework does not make decisions, and I do not propose an algorithm to make decisions, a function of life. I present a means for reflection on the scientific evidence and Socrates' three principles under specific circumstances to facilitate a dialogue between the public health providers and the public about scientific information, the information that supports health advisories.

The framework provides a starting point for a "process of informed consent" for public health, a means to approach the incommensurability in our perspectives from our unique cultural embeddedness. Chapter 5 provides some structural support for my only assertion, namely that the goal of public health risk communication ought to be the flow of meaning between public health providers and the public.

We are risking with the words we use to convey to each other our meanings. What should we say on public health advisories to be ethical? Should we say on the tobacco packages: "PUBLIC HEALTH CANADA asks: Fruits and vegetables protect against cancer! Should you be risking eating fruits and vegetables? Call us with your answer at our toll-free number 1-800-BLA-BLAH". Should we say on the alcohol products: "PUBLIC HEALTH CANADA asks: Alcohol causes birth defects! Should you be risking drinking alcohol while you are having your baby? Call us with your answer at our toll-free number 1-800-BLA-BLAH".

But what mass of information will be on the end of the telephone line? Who knows what to say, what people need to hear to help them see and choose in the moment? Who is the seer that will answer the 'phone'? Who can see the next step as the past comes to greet us, drifting in the winds of the future?

My thesis may be long, and perhaps at times my stream of ideas may flow into muddy waters, so as Socrates suggests to Hippocrates the boy:

> It is true that if a man talked on these matters with any of our popular orators, he might possibly hear similar discourses from Pericles or some other proficient speaker, but if one asks any of them an additional question, like books they cannot either answer or ask a question on their own account. Ask them the smallest thing supplementary to what they have said, and like a gong which booms out when you strike it and goes until you lay a hand on it, so our orators at a tiny question spin out a regular marathon of speech. (Protagoras line 329)

So if you hear the gong ringing and see me deaf in the mud, lay your hand on the gong, and see that I drift in the right measure of water. But, as Socrates says, "the risk is a noble one. We should use such accounts to inspire ourselves with confidence, and that is why I have already drawn out my tale so long" (Phaedo line 114d).

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Chapter 1. Public Health Risk Communication: Towards an Ethically Grounded Framework

1.1 Introduction

Health risk communication is an ancient activity and probably as old as culture itself. Krimsky and Plough (1988) suggest that human history is a story of dealing with and adapting to risks through myths, metaphors and rituals. Risk communication is embedded within our cultural discourse. The explicit and pervasive use of the word "risk" in connection with communication and health is a late twentieth century phenomenon (Golding 1992, Skolbekken 1995) and is a well-recognized characteristic of our present health culture. No one has developed a definition of risk that captures the plurality of conceptual meanings in the various academic disciplines and cultural groups (Renn 1992, Thompson and Dean 1996, Hrudey and Light 1996) and thus, paradoxically, there is a communication problem with respect to the notion of risk.

Risk communication embraces a broad range of communication activities in health care, from communication of benefits and harms determined in risk assessment to individual persons, through broad disclosures to the entire public by means of health advisories. In all of these areas, both common and unique ethical dilemmas develop. Therefore, I envision an ethically grounded framework encompassing the details of risk assessment and communication, taking into account the certainty and uncertainty of the information in relation to its value in improving the health of the target population.

The purpose of this chapter is threefold: (a) to document the need for an ethically grounded health risk communication framework (sections 1.2 and 1.3) (b) to introduce the recent bioethics concepts (section 1.4) and (c) to trace the history of ethical *desideria* in the *Canadian Journal of Public Health* concerning health communication and education (section 1.5).

An ethically grounded framework for health risk communication will share many common elements with frameworks for health education, but will have unique aspects relating to the particulars of risk communication. I propose an ethically grounded framework for health risk communication from a synthesis of the collective intuitions within the health communication field and the ethical critiques of communication practice from outside the field. I have identified common ethical elements by following the historical movement of public health communication activities documenting the ethical *desideria* of communicators in the *Canadian Journal of Public Health*. I also have identified some of the unique needs of health risk communication by an analysis of the risk communication literature. The most complete ethically grounded framework available for public health is that developed for the practice of medicine, generally referred to as "biomedical ethics" (Beauchamp and Childress 1994).

A central premise of this chapter is that "public health" and "health care" are different practices and each requires its own ethically grounded framework. One essential difference is that in medicine, the public knocks on the door of the physician, whereas in public health, the public health worker knocks on the door of the public (J. Howell, pers. commun. 1997). This viewpoint is reinforced by Crooke (1966) who wrote that "the public health worker is precisely the opposite of the traditional physician standing in warm relationship to his client (if only in ideal terms)" (Crooke 1966, p. 300). Lappe (1986) also has distinguished public health and medical ethics along similar lines, arguing that public health ethics deals with collections of individuals and is more concerned with community rights and society as a whole, while medical ethics is concerned with rights of individuals in relationship with physicians.

The frameworks for both practices may share an overall structure and even categories of ethical thought, but they will differ because of the essential difference and context in which they are practiced.

1.2 The Need for an Ethical Framework

For those interested in ethics, the greatest problem for risk communicators is that the practice does not have a framework through which ethical problems can be articulated, and perhaps even more importantly, one which can provide a basis for recognizing an ethical problem when it arises. For example, in Health Canada's *Health Risk Communication Handbook* (1996), there is no mention of an ethical framework nor any ethics guidelines. In fact, the word "ethics" does not appear anywhere in the text. Similarly, in the second edition of *Public Health and Preventive Medicine in Canada* (Shah 1990), there is no discussion of ethics and communication. The ethics content of the book is limited to reference to the "codes of ethics" of professional organizations and to health legislation, though there is some discussion of consumer rights, rights to health care and information.

The need for ethics in public health practice has been recognized. In *Maxcy-Rosenau-Last: Public Health and Preventive Medicine,* the discussion of ethics has developed significantly from the 11th (Shindell 1982) to the 13th (Last 1992) editions of the collection. The ethical discussion in the 11th edition was limited primarily to a discussion of public and individual rights (Shindell 1982). The 12th edition introduces the distinction between public health and medical ethics, ethical principles in public health like autonomy, non-maleficence, justice, and risk-benefit and cost-benefit ethics (Lappe 1986). In the 13th edition (Last 1992) there is a brief introduction to principle-based biomedical ethics, to problems encountered with balancing individual versus community rights, trade-offs between risks and benefits in public health decision-making, and a general overview of the complexity of ethical issues. However, there is virtually no discussion of ethics and risk communication or health education in any of the editions.

Some recognition of the need for ethics in risk communication within the field of risk studies can, however, be inferred from discussions regarding the concept of consent. In Health Canada's *Health Risk Communication Handbook* (1996), it is suggested that risk management decisions should reflect the public's informed consent. In *Maxcy-Rosenau-Last: Public Health and Preventive Medicine* (Last 1992), there is mention of informed consent with respect to all health care interventions and participation in epidemiological studies.

The general discussion of consent in the risk analysis literature reflects two approaches to decisions: centralized and decentralized. Centralized decisions refer to risk decision-making by a central authority, such as Health Canada. In contrast, decentralized decision-making reflects a more distributed process of decision-making, by local authorities in cities, or by individuals participating in a decision process. MacLean (1982) discussed the concept of consent from the point of view of centralized decisions, pointing out the practical impossibility of obtaining consent from the millions of people affected by risk decisions. However, there has been a growing appreciation of the need for public participation in risk debates. Calls for public participation reflect a democratic approach to decentralized risk decision-making and imply different notions of informed consent (Krimsky and Plough 1988, Slovic 1986, Otway 1987, Fiorino 1989, Slovic 1993). There is a tension between the choice of either centralized or decentralized risk decision-making, and the debate has important implications for the establishment of an ethical basis for risk communication.

Otway (1987) pointed out a distinction of two kinds of risk communication, reflecting either centralized or decentralized decisions. First, centralized decision-making places on risk communication the burden of persuading the public to accept centralized risk decisions. Otway suggests that communication of centralized decisions is actually a form of manipulation. In contrast, decentralized decision-making places a different burden on risk communication: informing people so that they can participate in the decision-making process. Otway suggests that the first type of communication may excessively reflect the concerns of the risk communicators and the second type of communication excessively reflect the anxieties of the public. Thus, each kind of risk communication reflects an inherent distortion, one from the technocratic and the other from the democratic path, to making and communicating risk decisions. In both kinds of risk communication there are significant ethical dilemmas.

Within this debate, Morgan and Lave (1990) have written a short editorial that outlines the general problems of ethics in risk communication, and they provide a framework for the analysis of the ethics in risk messages. They suggest that ethical dilemmas arise when messages are intentionally covert and when there is a mismatch between the objectives of the communicator and recipient of the message. They assert that there is no general agreement when communication should be intended to persuade as compared to manipulate people. They assert that it is even sometimes necessary to use coercion to have people move out of harm's way. For example, in the case of hurricanes, or acutely toxic chemical spills, they argue coercion may be well-justified. They defend the use of state paternalism and suggest that justification of coercion, manipulation or persuasion is determined by the severity of the risk, as viewed by the risk authorities. Consequently, they see the need for "informed consent" from the public as dependent on the nature of the particular risk.

Leiss (1995) describes risk assessment or the determination of risk as analogous to a poker game, where bluffing is a legitimate tactic, and where scientific data are played like poker cards in an effort to win the game. Leiss suggests we should assume that actors in the poker game will seek their own self-interest and that the public should not expect the situation to change in the near future:

> The point is only that risk assessment, communication, and management can be - and often is - a very dirty business. In particular, we know that the major players in the game of environmental and health risk controversies, when they are communicating with other parties, have made use of the inherent uncertainties in risk estimates, and the frequent lack of complete databases for full risk analyses, to advance what they perceive to be their own interests, and sometimes they will take steps to conceal what they do know (or suspect). It is unwise to hope that these proclivities will disappear anytime soon. (Leiss 1990, p. 688)

Leiss' discussion of risk management places additional burdens on risk communicators. The public needs to know who is playing their cards at the poker game, with what strategy, and whether they will "prematurely fold and become passive observers rather than shapers of the final outcome - before the final cards are dealt" (Leiss 1990, p. 687). The public needs to know how those who represent them can adopt the public-interest and drop their own self-interest. Further, the public needs to ask itself in the face of risk communication: What is the basis?

1.3 Ethical Dilemmas Observed in the Practice of Risk Communication: Case Studies of Chemical Contaminants in Food

A current problem exists in the communication of risks associated with chemical contaminants in food. In Canada, this is a unique problem because persistent bio-accumulative chemicals like toxaphene and polychlorinated biphenyls (PCBs) are transported to the north from the more southern regions of North America by natural atmospheric processes, popularly called the 'leap frog' effect (Wania and MacKay 1996). These chemical contaminants have concentrated in fish and wildlife and subsequently have been detected in human populations.

Toxaphene, a mixture of many related pesticides, was first used in the 1940s, then extensively in the 1970s when DDT was banned, until being banned itself in 1982 (EPA 1982). From 1950 to 1993, approximately 1,330,000 metric tons of toxaphene was consumed (Voldner and Li 1993). Toxaphene is now a key food contaminant of interest in Canada, as it bioconcentrates in fish and is not readily degraded (Saleh 1991, Swackhamer et al. 1993, Swackhamer et al. 1988).

In the *Canadian Journal of Public Health*, Kay (1950) published a paper entitled "Health Problems of the New Organic Insecticides", and claims the "recent laboratory findings on the DDT successors such as chlordane, toxaphene, and methoxychlor indicate that these compounds possess typical chlorinated hydrocarbon toxicity. Lehman rates aldrin, chlordane and toxaphene higher in toxicity than DDT" (Kay 1950, p. 377). Furthermore, the article claims that "DDT and its analogues may be stored in considerable quantities in animal fat and be excreted via the mammary route" (Kay 1950, p. 376). Should the health problems that we are facing with respect to toxaphene, and food contaminants in general, for example PCBs, have been predicted by reading and applying the literature in 1950? If toxaphene was found more toxic than DDT in 1950, why did toxaphene replace DDT when it was banned? What was the countervailing evidence?

A comprehensive report documenting problems in communication of health risks associated with these chemical contaminants has been produced by the Inuit Tapirisat of Canada (Usher et al. 1995). This document details the experience of communicating information about contaminants in food to aboriginal peoples in the north. The researchers point out that under the best of circumstances, communicators face challenging ethical questions in balancing the community's right to know, the need to protect public health, the cost of unnecessarily alarming people, and the uncertainty of much of the scientific information. The text documents the problems associated with translating into native languages even the most basic technical information and scientific concepts related to the contaminants and their associated health risks. Further, they suggest that the needs of the community are not met in current communication strategies: the people want a definitive diagnosis of their food safety and are not satisfied with technical, quantitative information intended to enable them to calculate probabilities of food safety for themselves. The researchers suggest that the needs of the community place a burden on them (the researchers) that they cannot fulfill.

Usher et al. (1996) cite examples of misconduct with regard to the communication of results. For example, they cite cases where research information was released to the media before being communicated to the aboriginal communities under study, and cases where individuals and communities never received the test results. They also note ethical concerns inherent in the power differential between the communities and the research industry, and further that the research industry is flourishing from the exposure of aboriginal people to contaminants. They support the need for an ethically grounded framework that might help researchers manage these types of problems and to develop improved research strategies that prevent many of the ethical problems encountered.

Archibald and Kosatsky (1991) describe similar risk communication problems associated with cadmium in food in the James Bay area, and they point out how difficult it is to tread the narrow path between alarming people needlessly and hiding from them information that might help them adopt health-enhancing behaviours. Poor risk communication can cause harm to people, can mislead people with respect to the nature of risks and thus does not foster informed choice. Interestingly, both Usher et al. (1996) and Archibald and Kosatsky (1991) suggest that advice is best formulated and presented in cooperation with the community. The difficulties of this strategy were previously expressed by Ethel Martens (1966), in her communication and health training studies with Indians and Eskimos (or Natives and Inuit): "Words at times caused tension. It was pointed out on several occasions that communicators can never be sure that the words they use mean the same to the receiver as to themselves" (Martens 1966, p. 500).

Problems associated with communication of chemical contaminant risks are not isolated to northern Canada. In British Columbia and Alberta, fish stocks have been contaminated with dioxins, furans, and organochlorines from pulp mill effluents released to the river systems resulting in the issuing of fish health advisories (B.C. 1994, NRBS 1996). Contaminants in fish are a problem for the Great Lakes and St. Lawrence river ecosystem as well. In addition, there are potent shellfish toxins, like paralytic shellfish toxin - saxitoxin - that are acutely toxic, sometimes causing death within one hour of consumption. Health advisories are used to warn people when the toxins reach high concentrations (Martin 1990). In the United States in 1995, there were 1,306 fish advisories for mercury, 438 for polychlorinated biphenyls (PCBs), 122 for chlordane, 52 for dioxin, and 35 for DDT (EPA 1996). With so many health advisories, is it possible to assess their individual or collective effectiveness? In the affected communities, is there any understanding of the contaminant risks?

In contrast, the artificial chemical sweetener saccharin was banned because health regulators in Canada decided that the risk could not be effectively communicated (Harrison and Hoberg 1994). Canadian regulators felt that Canadian consumers could not make their own decisions about whether to consume saccharin because they believed that warning labels would be ineffective. They believed that only 11 to 15 percent of people actually read warning labels, and that the amount of information required for a person to make an informed decision would require an impracticably elaborate warning label. Should this same logic be applied to the contaminants in fish? Do health authorities feel more confident about the public's understanding of contaminant risks to fish and the public's ability to understand fish advisories? Are fish advisories an ethical form of risk communication? Are the fish health advisories an expression of guilt over our inability to prevent industrial contamination in the first place - a covert *'mea culpa'*?

As an initial ethical approach to these questions, there are three publications dealing specifically with health communication and ethics: *Ethical Issues in Public Health Policy: Health Education and Lifestyle Interventions* (Faden and Faden 1978), *Ethical Dilemmas in Health Promotion* (Doxiadis 1987), and *Ethics in Health Education* (Doxiadis 1990). There are also several papers discussing ethics and communication in occupational medicine stemming from the notion of the "right to know" of occupational hazards (Schulte and Connally 1993, Faden and Beauchamp 1982) and from discussions of ethics in environmental epidemiology (Soskolne and Bertollini 1996). The ethical critique of health communication practice in most of these cases relies on applying the bioethics framework. As will be shown below, an alternative to this framework may be more appropriate.

1.4 The Bioethics Framework: Principle-based and Relational Ethics

This brief literature review reveals that the most developed source for a framework for ethical public health risk communication is from biomedical ethics, or more broadly principle-based ethics. The principles of the framework have been canonized by Beauchamp and Childress in their book *The Principles of Biomedical Ethics* (Beauchamp and Childress 1994). There are four main principles: respect for autonomy, beneficence, non-maleficence and justice.

The principle of respect for autonomy states that individuals have the right to self-governance and that healthcare professionals should respect this autonomy in their attempts to promote the good of the individual. The core idea of autonomy is self-determination. The purest forms of autonomy suggest that the information needs of individuals are to be determined by the individuals themselves. In contrast, strong paternalism asserts that benefactors ought to manage all information, and that they should communicate only that information which they feel the patient needs to know. Decisions are reached without the patient and the only information provided is that which supports the decision. Strong paternalists nonetheless act beneficently by protecting individuals from the potential harmful consequences of their own actions.

The principles of non-maleficence and beneficence deal respectively with the concepts of preventing harm and promoting good. Non-maleficence refers to refraining from inflicting harm while beneficence refers to preventing harm, removing harm and promoting good. The principle of beneficence consists of two equally important obligations: (a) an obligation to help others further their important and legitimate interests, and (b) the obligation to help patients weigh and balance possible benefits against possible harms.

The promotion of health, in the context of the principle of beneficence, requires that benefactors explicitly respect individuals who require their special services. This respect is made manifest through a healthcare provider's recognition of the legitimate interests of those in need, and recognition of the further need to balance the consequences of action. People in need enter a trust relationship with the healthcare professional because they depend on their expert services. The relationship then is a fiduciary one and requires mutual respect by both parties.

The principle of justice concerns what is fair or deserving and equal. For example, justice means that all people deserve health care as members of society or, more basically, because they are humans in a society of moral equals. Theories of distributive justice suggest that goods and services, like health care, should be distributed fairly to all members of society to a basic standard level of health care regardless of social position.

With respect to risk communication, personal autonomy and justice are respected by the concept that all have the "right to know" of risks to health (and also to the environment). For example, in Alberta, the Freedom of Information and Protection of Privacy Act (Chapter F-18.5) (Gov. of Alberta 1994) states:

> 31 (1) Whether or not a request for access is made, the head of a public body must, without delay, disclose to the public, to an affected group of people, to any person or to an applicant a) information about a risk of significant harm to the environment or to the health or safety of the public, of the affected group of people, of the person or of the applicant, or b) information the disclosure of which is, for any other reason, clearly in the public interest.

This act places a duty to inform the public about health risks and supports a conception of justice that all members of society deserve to have information about risks such that it would be unjust to withhold this information from any individual.

The four principles of bioethics are not an ethical theory. Rather they are interpreted differently according to different ethical theories. For example, a person who is a proponent of the ethical theory of utilitarianism, a consequence or ends-based theory, whereby the actual or expected consequence or end determines the best action, will interpret the four principles in a particular manner. This interpretation will be different from that of a proponent of a different ethical theory, such as Kantianism, a deontological or personal duty-based ethical theory, where the means to the end are as important as the end itself. However, the different theories should not be considered as so radically divergent that they never agree under any circumstances, because often times different theories lead to similar action guides.

Faden and Beauchamp (1986) develop a framework through which to interpret communication consisting of three types of action: coercion, manipulation and persuasion. Their description of these terms has been defined in the context of informed consent, with special emphasis placed on the nature of individual action. They define an autonomous action as free from manipulation or coercion and view an autonomous agent as "resistant to social conformity, having reflectiveness, understanding and insight, and resistant to manipulations attempted by others" (Faden and Beauchamp 1986, p. 236). According to a principle-based ethic, then, risk communication should foster public autonomy.

Relational ethics is developing as a critique of principle-based ethics, largely initiated by Gilligan's (1982) work, 'In A Different Voice'. Relational ethics is not an ethical theory *per se*, but consists of a loose collection of ethical writings. In contrast to principle-based ethics, relational ethics is an attempt to transform principle-based ethics into action and focuses on the particular relationship experienced between individuals; for example, the relationship between the healthcare provider and the person. This relationship cannot be governed by rules alone, nor the actions regimented by guidelines (Bauman 1993). Each relationship has its peculiar context that cannot be fully anticipated. In a particular relationship, there are few certainties. Ethical principles and communication guidelines or rules alone cannot direct action. By definition, principles and rules are static and do not readily lend themselves to dynamic situations. As elegantly stated by Bronowski and Mazlish (1960) "the pattern of experience is not, as mathematics is, held together by logical and necessary relations. Experience has to be lived, it cannot be imagined" (Bronowski and Mazlish 1960, p. 475). Thus, principles are to be reflected upon in situations, where they serve more like proverbs than commandments.

In the case of risk communication, this approach would require that the risk communicators have an ability to transcend abstract principles, determining which ones best relate to the situation at hand. Such a contextualist approach to ethics requires understanding how the various principles can be applied and prioritized.

The goal of relational ethics is full engagement in the relationship between the individual participants of the decision and encouragement of mutual understanding for all individuals (Gadow 1995). This process has been described as developing a joint ethical narrative. Understanding cannot be imposed; it must be developed through experience and necessitates the development of mutual and practical knowledge, which characterizes relational ethics.

An example that applies to both health care and public health is developing a mutual meaning of the concept of risk. The meaning and significance of risk cannot be imposed on the patient or on the public by healthcare providers or risk communicators because they do not share the same lived experience. The patient or citizen has a unique social context and likewise for the healthcare provider or risk communicator. Each will have an unique perception of a given risk. The difficulty of this approach is how to locate the meaning of a given risk in the context of the patient's or citizen's own terms of reference. For example, the Inuit in the north of Canada want to continue to eat fish despite established levels of contaminants. For the risk to have meaning, it needs to be placed in the context of the entire life of the Inuit people, and understood from that point of view. Billy Day of the Inuvialet Game Council in Inuvik, N.W.T., says: "It would take a lot of proof that (polluted whale meat) is harming us before we would give up our way of life, our way of eating" (McCarten 1995). In contrast, healthcare providers or risk communicators are very influenced by their own social and scientific context and may have a very technical meaning of risk, based on the probability of harm and its consequences. The communicator may define risk as a comparison of the level of contaminant in food in reference to a standard for the contaminant developed by Health Canada. The meaning of risk to the risk communicator and to the Inuit is referenced to different social contexts. Risk communication from a relational ethics perspective needs to consider how these contextual issues lead to different understandings of risk. In the best situation both the Inuit and healthcare provider will understand the meaning of risk in terms of each other's social context. Relational ethics adopts Bronowski's (1956) claim that, "if the only criterion of true and false which a person accepts is that person's (own opinion), then that person has no base for social agreement" (Bronowski 1956, p. 72).

1.5 Ethical *Desideria* in Public Health Risk Communication Practice: An Historical Perspective

The development of an ethical framework for public health risk communication should be derived from the practice of public health, in keeping with the social axiom developed by Bronowski (1956) that we ought to act in such a way that what is true can be verified within the practice of medicine. Bronowski (1956) claimed that "the values of science derive neither from the virtues of its members, nor from finger-wagging codes of conduct, but have grown out of the practice of science, because they are inescapable conditions of its practice" (Bronowski 1956, p. 77). Public health risk communication needs to be explored for ethical presuppositions. The intuitions from within the experience of health risk communication practice provide a basis for developing a meaningful blend of the bioethical principles and relational ethics and will provide a basis for an ethically grounded framework derived from public health's own activity.

The following historical discussion is based on the health risk communication literature, largely from the *Canadian Journal of Public Health*, because we are interested in developing an ethical framework primarily useful for health risk communication in Canada. We chose specific excerpts to document public health practitioners' writings on ethics and communication through the 20th century. During this century, health risk communicators' perception of people and ethics can be observed in the change in the language used to describe the public and health risk communication. The change has been from a "rationalistic" stance, devoted to abstract principles, where they believed individuals simply needed to be provided facts about health to promote healthy behaviours, to an appreciation that people are situated in a particular cultural context, and therefore need more than facts. This new appreciation is reflected in the progressively increasing importance placed on autonomy and relational ethics.

1.5.1 History of Health Risk Communication

In Canada, public health professionals have been formally discussing and practicing health risk communication and education of the public for at least 120 years. In 1875, the first voluntary health organization to be inaugurated in Canada was the *Citizens' Public Health Association* and at its first meeting, the emphasis on communication was included in its mission statement (Heagerty 1928):

> This society shall be called the Citizens Public Health Association. Its objects shall be to increase and diffuse knowledge on all subjects relating to the public health, by the discussion of sanitary objects, by the exposure of sanitary evils, and by promoting sanitary legislation. (Heagerty 1928, p. 1)

It should be noted that the word 'risk' was not used at this time. Over the years, various public health risk communication activities developed. However, there is no single name given to the various risk communication activities. Some of the common names that appear in the literature are: health promotion, health education, health advisory, hazard warning, and finally risk communication in 1986. The similarity in the communication activities can be observed in the similarity of definitions over time. Anna Wells said in 1932:

> Health education may be defined as the activity of instructing the public in matters relating to physical, mental, and social health, in all age

> groups. Publicity in health education is making health information public. And the purpose of publicity is to arouse interest in and to interpret public health work, and to provide healthful living. (Wells 1932, p. 344)

In Health Canada's Health Risk Communication Handbook (1996), they have adopted Davies's (1987) definition of risk communication:

> ...any purposeful exchange of information about health or environmental risks between interested parties. More specifically, risk communication is the act of conveying or transmitting information between interested parties about health or environmental risks; the significance or meaning of such risks; or decisions, actions, or policies aimed at managing or controlling such risks. (Davies et al. 1987, p. 1)

A more recent definition of health education has been presented by Downie in 1990:

> Health education is an activity aimed at preventing ill-health and furthering positive health through creating understanding of the human body and its workings, through the provision of information about health services and access to them, and through creating understanding of national and local policies and environmental processes which may be detrimental to health. (Downie 1990, p. 10)

All three definitions share the idea of health risk communication as the act of transmitting health information to the public toward the goal of achieving improvements in health and preventing ill health. More generally, risk communication provides individuals with the means of guiding or influencing the inevitable forces of change that occur throughout life. In Canada, it is arguable that the 'Action Statement for Health Promotion' (1996), which contains the Ottawa Charter for Health Promotion (1986), and "Achieving Health For All: A Framework for Health Promotion" (Epp 1986), provide much of the justification for all public health risk communication activities at the present time. Modern health promotion recognizes the need to target messages to the specific audiences for which communication is intended, be it government, the media, or the public.

Horner (1992) has written a brief survey of ethics and public health and describes the first stage of public health in the last century as being primarily concerned with ameliorating the deplorable environmental conditions and eradication of communicable diseases. Utilitarianism was the dominant theory, in which the principles of individual autonomy and confidentiality were subordinated to the greater good of the community.

Bates, in 1936, expresses concern of past health communication practices and proposes a new ethics for communication. This embodies the principles of non-maleficence and beneficence with a generally utilitarian perspective:

> We are all aware of the value of publicity to the charlatan who desires to sell his wares. Unquestionably this type of publicity has done a great deal of harm and for a long time the medical profession, obsessed I think with a false conception of ethics, felt that it was unwise or undignified to make a definite attempt to keep the public from straying into the paths of error even by the simple procedure of pointing out to them the truth in connection with the solution of many medical problems of a personal character.
>
> I think that to a certain extent that day has passed and now considerable public health education of a legitimate character is being carried on through the press and by the other means which may be calculated to do a great deal of good. I think that there is no doubt that while so called ethical considerations have been a hindrance in many directions in the past, the main consideration today, on the whole, is held to be the greatest good for the greatest number. (Bates 1936, p. 13)

The adoption of a utilitarian theory for public health has been stable over the century. Basically the same message was repeated in a 1977 editorial by Schwenger:

> A good deal of misunderstanding appears to exist as to just what is meant to those in the field and to others by the term "public health". One of the most comprehensive modern definitions of public health is that of the Chief Medical Officer for Scotland, Sir John Brotherson: "The organized application of resources to achieve the greatest health for the greatest number". (Schwenger 1977, p. 117)

At a closed meeting, Brotherston elaborates further that it is the greatest health for the greatest number 'on the meanest budget' (Howell J., Personal Communication, 1997). Now we would refer to the greatest health gain meaning the greatest achievable improvement in health for the population under study.

1.5.2 ~ 1900-1930: Rationalistic, Weak Paternalism

Early in this century there was increasing emphasis on informed consent and democracy. This can be seen in writings concerning the attitude towards communication with the public. Hague, in 1929, describes a change in the ethical practice of public health as reflected in health risk communication in terms very similar to Faden and Beauchamp's (1986) scheme of communication:

> Today is the day of persuasion rather than force; of education rather than compulsion. The work of educating the public is the most important duty of all public health workers. We must have co-operation of the people. (Hague 1929, p. 28)

Similarly, Murray, in 1929, describes the strategy used to enact legislation for the pasteurization of milk. However, there is a paternalistic tone to the message, with a limited appreciation of personal autonomy:

> Education and propaganda must not only accompany but precede any effort to control successfully the public or the individual. The days of enacting laws which are not based on the wishes of an informed public are past. The support and co-operation of the bulk of the people must be assured before we can legislate. (Murray 1929, p.173)

Rosen (1960) critiques this period in health education as "rationalistic"; the emphasis in health risk communication is placed on providing just the facts in a clean and straightforward fashion and assumes that individuals would make decisions, and change their behaviour, on the basis of facts alone. Rosen (1960) suggests that health educators believed they had the facts, and these were to be "handed down from above" to the public. Douglas in 1930 wrote of the public:

> It is not that I think because the people as a whole are unwilling to countenance new and sometimes rather revolutionary things but is due to unwillingness to approve something which they do not understand. That they do not understand is often because they have had nobody to instruct them or that the instructions they have received have not been given in a convincing manner, with arguments driven home by incontrovertible facts and demonstrations. People should be told in a language as little technical

> as possible, what we are trying to do and why we want to do it. (Douglas 1930, p. 264)

There was some concern and appreciation of fear and harm caused to individuals through communication, a clear indication of concern for the principle of non-maleficence. Evidence of the "rationalistic" norm of behaviour can be seen in an editorial by McCullough in 1933 about cancer communication:

> In the early days of cancer publicity there was danger of cancerophobia. As in the case of consumption thirty years ago, people had an intense fear of cancer, and public discussion of the subject seemed to increase this fear. Considerable experience in addressing audiences of women on the subject of cancer has satisfied the writer that discussion of the ordinary facts about the disease no longer creates fear. There is no danger of cancerophobia to-day. Cancer education is a safe procedure. (McCullough 1933, p. 41)

At the same time, there was a commitment to portray the facts as accurately as possible, implying a commitment to ensure the scientific quality of information and to avoid misleading the public. These norms can be interpreted as early intuitions of guidelines for ethical communication. Hague (1929) writes:

> The work of educating the public is the most important duty of all public health workers. It then devolves on health officers, sanitary inspectors, and public health nurses to apply this knowledge, always being first sure that it is thoroughly proven, and not the propaganda of some faddist. It must not be merely theory or unfinished investigation. My point is that the sanitary inspector should be up to date and able to impart accurate information. (Hague 1929, p.28)

Douglas (1930) expressed a similar opinion but also discussed the problem of information over-load in a manner that is applicable today:

> It is important that any information we give out or any measures that we advocate shall be of proven efficiency and no unsound theories nor procedures which are still in the experimental stage be recommended for general adoption. There is so much mis-information about health subjects current today that we should be careful not to sponsor anything that is not as certain as anything can be in this all too uncertain world. (Douglas 1930, p. 264)

1.5.3 ~1930-1950: Weak Paternalism: Awareness of the Importance of Context and Relationships

The success of improving health through health facts alone began to be questioned in the 1930s. Gudakunst (1942) describes how other information besides health facts motivate people, primarily that of cost-benefit analysis. The following quotation of one case study of tuberculosis control during the depression provides an interesting notion of justice and resource allocation that seems all too applicable in the discussion of health and health care reform today:

> When the people were shown it was unprofitable to tolerate tuberculosis something was done - and done in a hurry. For many years that community had fostered a tuberculosis control program based on education - based on an interest in health - based on an appeal to fairness and decency to mankind. This was all nice clean health education, but tuberculosis deaths dropped at a heartbreakingly slow rate. When the health officer used the methods of salesmanship based on dollars and costs of disease, speedy action was secured. The public was not interested in health; it was interested in the cost of disease. (Gudakunst 1942, p. 493)

Further, Gudankunst (1942) suggests that health practices are motivated by other forces, not even related to health concerns. He introduces the idea that health practices are related to cultural factors, "custom, fad, and fashion", and that health communication should consider these forces in trying to change public behaviour. Similarly, Gilbert (1942) suggests that education of adults would be only partially effective because health habits have developed for twenty, thirty and forty years and are therefore very difficult to change. In the 1940s there began to be an appreciation for the limitation of guidelines for practice and the need for a new relationship with the public. Mathews (1943) offers a new conception of the sanitary inspector, in juxtaposition to their past role as a law-enforcement officer. He suggests problems associated with public relations and offers a solution that is intuitively connected to the conceptions of relational ethics and fostering public autonomy:

> We know from experience that no stereotyped method can be adopted but that each must be dealt with according to the circumstances surrounding it. However, one definite rule can be established, and that is that nothing is more undesirable than a domineering, officious approach. This means that the inspector should aim at the development on the part of the public of what may be termed a "public health consciousness". So the inspector must approach the public with an open mind on the matter being dealt with even to the point of placing himself in the same position as the public in order to understand their viewpoint. (Mathews 1943, p. 80)

Bladen (1949) emphasizes culture and links the concept with his intuitions of ethical communication. His argument presents a similar recognition of the limitation of guidelines as that found in Mathews (1943), as well as the need to move beyond standards of communication practice, and suggests that professional practice standards, or "rules of conduct", are not a substitute for understanding the people whom public health serves, and how these people should be treated. However, Bladen develops a deeper intuition of relational ethics by reference to relationships with oneself, suggesting that "we need to understand a good deal about our own failure to behave the way we know we ought to behave" (Bladen 1949, p. 285). Bladen places emphasis on engagement with the public and an understanding of the social context of experience and the emotions:

> Rules of conduct listed on a card are no substitute for such understanding. Indeed there are generally many different ways of handling any given human situation each of which may prove successful; there is probably a best way for each one of us but since we are different there is almost certainly not one best way for all of us. Each of us, however, is more likely to handle the situation better, the better he understands the "feelings" of the people he has to deal with. It must also be understood that these "feelings" are not purely individual but are in large part conditioned by the social structure of the group (or groups) to which that individual belongs, and particularly of the social structure of the work group. (Bladen 1949, p. 286)

1.5.4 ~1950 to the Present: Fostering Autonomy

A change in the conception of the public from the early century as being "rationalist", to a "public imbedded within a culture", complete with a particular view of the world and of health because of this cultural position, was clear by 1960. Rosen (1960) further introduces the concept of perception, which has figured very prominently in risk debates, particularly in the work of Paul Slovic (1987):

> The fact is that human behaviour is the result of emotion as well as reason, and that it is in large measure focused through perception. People act in terms of what they perceive, and of their interpretations of this information. The perceptions which lead people to act in certain ways and not in others are interpreted within a frame of reference which is social in origin. (Rosen 1960, p. 10)

Rosen (1960) suggests the context of the individual must be considered in trying to change behaviour through communication. Health educators must become aware of the culture, described metaphorically as the "geography of the country", and that values are expressed through formal and informal structures which "channel the psychological processes of individuals". This concept of the mind is related to the 'mental models approach' (Atman et al. 1994) which is gaining prominence in risk communication today.

In discussing the potential for success of education, Rosen suggests that educators should try to influence change "in a direction acceptable to the individual or group". This reference to "acceptability" could be interpreted as an intuition of consent and autonomy. Rosen (1960) demonstrates an awareness of the ethical nature of communication by arguing that health education is the imposition of values onto a group that does not necessarily share those values and that "it should not be overlooked that recent health education in its various facets reflected and still reflects middle class values and orientations" (Rosen 1960, p. 9).

The problem of imposition of values in relation to health is developed further by Szasz (1966). Szasz questions the World Health Organization's conception of health as being not only the absence of disease, but the presence of complete physical, emotional, and social well being. Rather, Szasz discusses the concept of health and behaviour as derived from a basic positive-negative or optimism-pessimism framework which we develop throughout our lives. He argues for presenting health education and risk communication in a manner that reflects the complexity of cultural values that define our lives, and against "static health rules" that do not match the dynamic process of health. Szasz suggests a recasting of health in terms of the needs defined by the individual, or in other words, health from the perspective of autonomy:

> Because our lives change from hour to hour and from day to day, it is not reasonable to think of a prolonged state of well-being. It is quite reasonable, however, to think of health as a condition which is best suited to reach the goals which the individual formulates for himself. (Szasz 1966, p. 209)

The limitations of science and the need for ethics in dealing with risks of modern society were recognized by some authors in the late 1950s. Pierre Dansereau (1958) emphasized that solutions to modern problems cannot be answered without a scientific foundation. Science is most specifically, a method of inquiry, knowing through experience of our directed operations, which has proved useful in seeking truth. Science produces a body of knowledge with a set of theories and facts describing the relations of the material world and ideas. Still, he claims that science is "no sacred cow" and does not offer all the answers. Dansereau's discussion in the context of nuclear risk is relevant to the current risk debate, and his conclusions parallel those developed recently in the risk field:

> As for the moral, economic, political, consequences, Science must refuse any special competence, and, of course, any special responsibility. Otherwise, the people are led to abdicate to a technocratic power, as they may have done to a theocratic, aristocratic or plutocratic one in the past. (Dansereau 1958, p. 470)

Public healthcare providers have been practicing and discussing risk communication for 120 years in Canada. During this time, valuable intuitions about ethics in risk communication have been articulated, with an increasing importance on relational ethics and the principle of respect for autonomy. Early in the century, it was recognized that public healthcare providers should provide information that is either proven or of sufficient scientific validity. This demand is of increasing importance in our present information age. The concept of relational ethics articulated in the public health literature is one that proposes engagement with the public, understanding of the cultural context of their lives, and flexibility in communication approaches to accommodate the context. There also is a need to recognize the principle of respect for autonomy so that members of the public can define health goals in the terms of their own lives and participate in shaping risk management decisions.

1.6 Conclusions

This chapter argues that there is a need for an ethically grounded framework for health risk communication as practiced in public health. This need results from the inherent ethical dilemmas involved in the practice of risk communication. The need for ethics was demonstrated through the example of problems encountered in the communication of risks from chemicals in fish. Recognition of the need for ethics in risk communication in the risk communication literature was discussed and, in particular, the debate surrounding the concept of consent was noted as relevant to ethical risk communication.

We argue that the basis for an ethically grounded framework for public health risk communication can benefit substantially from the experience of bioethics as developed for the practice of medicine. Nevertheless, the framework will need to be flexible in its particulars because of the inherent differences in public health practice and the contextual sensitivities associated with communities. The difference between medicine and public health needs to be articulated in greater detail to distinguish between public health ethics and biomedical ethics. The ethical framework for public health risk communication must be derived from the practice of public health. Therefore the development of Canadian public healthcare providers' ethical *desideria* were traced to provide a basis for the framework for public health ethics. We emphasize the relevance of relational ethics in the public health literature and therefore believe such an ethic needs to be articulated in greater detail.

1.7 References

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Chapter 2: Relational Ethics: A Framework For Health Risk Communication

2.1 Introduction

The purpose of this chapter is to develop an ethical account of health risk communication in health care, as it operates between people and healthcare providers. The more general goal is to extend this model to the analysis of "risk communication relationships" in public health; namely to explicate a model for health risk communication in public health as it operates between people and health risk communicators. Toward this end, I develop a framework of relational ethics, discuss the concept of informed consent and offer an account of the relationship between the healthcare provider and the person[1] which I call fostering autonomy through mutually respectful relationships. The arguments for this view are derived from developments in relational ethics and the intuitions of relationship and ethical public health risk communication practice that developed over this century in the *Canadian Journal of Public Health* (see section 1.5).

In the first section of the paper, I discuss the emergence of bioethics, the ethical concerns from the awareness of risk, and the susceptibility to harm from chemicals in the environment. The second section of the paper describes the origins and basis of principle-based biomedical ethics (Beauchamp and Childress 1994). This model was developed as an ethical framework for the practice of health care. Relational ethics develops from a synthesis of the less well-articulated ethic of care and principle-based bioethics, and is discussed in section three. The developing nature of relational ethics is compared to the dominant bioethics paradigm, principle-based biomedical ethics.

In the fourth section of the paper, the concept of informed consent is discussed because it provides the focal point for ethics in both the practice of health care and risk communication. Informed consent is discussed as both an act and as a process. The act of informed consent focuses on specific key events in the medical encounter, such as the signing of the informed consent document. The process of informed consent focuses on the subtle events that make up the entire medical encounter; the emphasis is on that plurality of acts which, taken together, shape consent in the health care encounter. Health risk communication is discussed from both perspectives of informed consent.

In the final section of the chapter, a model for the public health risk communicator- public relationship is developed by examining two general models in health care. In these two models respectively, the relationship is restricted by placing the decision-making authority (autonomy) solely in the hands of either the healthcare provider or the person. Analysis of these two perspectives leads to the need for a relationship based on a shared concept of autonomy, which I call fostering autonomy through mutually respectful relationships. This is characterized as autonomous individuals in reciprocal relationship, deliberating together to reach decisions that both benefit the person and are consistent with the person's values.

2.2 Emergence of Ethical Issues and Concerns Through Awareness of Risk and Susceptibility to Harm

Biomedical ethics developed in the mid-twentieth century largely in response to atrocities in health care and a challenge to the Hippocratic ethical tradition (Pellegrino 1993). These include the experiments of National Socialism in Germany, documented by the Nuremberg trials (1947); the Tuskegee Syphilis Study (1932-1970) performed on African Americans by the U.S. Public Health Service (Faden and Beauchamp 1986); or in Canada, the psychiatric experiments on patients at the Allen Memorial Institute in Montreal (Collins 1988) and the eugenic sterilization program that operated in Alberta into the 1960s (Caulfield and Robertson 1996). In these cases, citizens were unknowingly experimented upon causing them serious harm. The relationship between the healthcare provider and the person was not based on mutual understanding and in some of these cases was based on strong paternalism.

However, bioethics also developed from the emergence of new ethical concerns in health care resulting from the rapid changes in technology and scientific knowledge. For example, Bates (1994) has documented the emergence of public health concerns from chemicals over the last half century, in reference to the year of major publication: 1952 air pollution, 1963 cigarettes, 1975 asbestos, 1980 lead. More recently, the risks from chlorinated compounds have become known, like dioxin and polychlorinated biphenyls (PCBs) (see section 1.3). Further, the knowledge that chemicals in the environment act as reproductive toxins and xenoestrogens (Toppari et al. 1996) and neurotoxins, for example PCBs (Segel 1996, Jacobson and Jacobson 1996), and not simply as carcinogens, has sparked new concerns over the exposure of the public to chemical pollution. With respect to both cancer and xenoestrogen effects of chemicals, laboratory studies have demonstrated that mixtures of chemicals cause effects at dose levels below the apparent thresholds of single chemical studies (Krishan and Brodeur 1991, Krewski and Thomas 1992, Seed et al. 1995).

The continual emergence of new scientific knowledge in each of these cases demonstrates the uncertain and transient nature of our scientific knowledge and beliefs. The scientists of 1950 did not see the consequences of chemical refrigerants, thinking they were safe. The scientists of 1997 see the hole in the ozone layer[2] and the strange unforeseen connection between chemical refrigerants and skin cancer (Bueckert 1997, McMicheal 1995, Cambell and Birdsell 1995). Similarly, the contamination of fish from atmospheric transport of chemicals (see section 1.3) and the problem of acid rain was not anticipated by scientists in Canada (AETF 1997, McMicheal 1995, Schindler et al. 1996, Yan et al. 1996, Likens et al. 1996). Further, there has been a gradual transition of scientists' beliefs over this century, from predictions of global cooling to Arrhenius' (1896) century old hypothesis of global warming, as a result of the combustion of fossil fuels and release of carbon dioxide (Flavin et al. 1996, Adams 1995). The health effects from these processes to human health needs to be assessed (McMicheal 1995, Patz et al.

1996). In short, scientists' claims are a product of their times. This is a positive feature of science culture as it allows scientific methods to grow and change in response to new evidence. However, in the cases above, scientific knowledge did not provide a state of certainty upon which to base ethical claims, or to support health and social policy. As Peirce says in 1878: "In no possible state of knowledge can any number be great enough to express the relation between the amount of what rests unknown to the amount of the known" (Peirce, 1966 p. 134).

Dewey (1929) remarks that the multiplication of technology "may even be bemoaned as a new source of dangers. Each of them demands its own measures of protection. Each one in its operation brings with it new and unexpected consequences having perils for which we are not prepared" (Dewey 1929, p. 8). Bauman (1993) comments that between deeds and their consequences there is a huge distance, both in time and space, such that we cannot fathom the unanticipated consequences, and this casts us into a state of moral uncertainty. The well-tested ethical rules we inherit from the past are for people within our sight and reach. The rules guide action based on their visible and predictable effects on others. This is particularly apparent with respect to the risks posed by chemicals in the environment. An ethicist in 1950 may have said chemical refrigerants are safe, they cause no harm, and in fact they promote good by avoiding food spoilage, and thus the ethicist may have recommended the use of refrigerants following a well-tested ethical rule - beneficence. Yet, with respect to both science and ethics, we are in a state of uncertainty; we cannot fully anticipate the consequences of our actions, and the unanticipated consequences cannot be part of the explicit calculation that precedes the act (Bauman 1993). The awareness that each action cannot be characterized explicitly as safe or dangerous, producing pain or pleasure, benefits or harms, is what defines our present epoch as a "risk culture".

Public health has relied primarily on a consequential approach to ethics, with the relationship of public health providers and the public based in paternalism (see section

1.5.1). However, the pressing environmental and human health effects we now face demonstrate that this approach has failed. Vineis says that since scientific facts depend on theories and background knowledge, as is the case with ethics, we need a deontological ethic, or a duty-based approach, to contribute to the interpretation of scientific results as applied to protecting the public, since this task requires extra-scientific personal values in determining acceptable risk (Vineis 1995). This need can be met by expanding public health ethics from its historic consequential stand through grounding the relationship between public health practitioners and the public in relational ethics, as it develops from the principle-based ethics.

2.3 Principle-based Ethics

The paradigm that developed to respond "ethically" to health care's problems is rooted in liberal individualism. It replaced both traditional paternalism, with its roots in the Hippocratic oath, and society's willingness to sacrifice the individual. Patient and research participants' rights were developed, thus recasting the individual as the "end" of health care and biomedical research, not a "means"; that is, as someone entitled to self-rule or, at least, respect as an autonomous moral being (Wolf 1996). The three pillars of principle-based ethics are characterized as: (a) respect for autonomy, from Immanuel Kant's deontology; (b) beneficence, from John Stuart Mill's (1964) *Utilitarianism* and *On Liberty*; and (c) justice, from John Rawls' (1971) *A Theory of Justice*.

The principle of respect for autonomy, which essentially means respecting each person's ability to freely make decisions or choices, develops from Kant's deontological ethics as a product of two propositions: the "categorical imperative" and following from it the formula of "the end in itself" (Kant 1785). Deontology is a duty-based ethic; actions are considered morally good if they follow from a duty or principle prescribed by reason, and not from the consequences the action produces. This is Kant's "categorical imperative": we ought never act except in such a way that we can also will that our maxim (subjective principle of action) should become a universal law (Kant 1785, p. 70). A universal law means that the categorical imperative prescribed by the principle of action applies to everyone, not only to oneself, and in all situations. A categorical imperative in public health risk communication would be that "we should not make false promises" to the public, for example promises that we have no intention of keeping, but are made instead to remove us from a difficult situation.

The formula of "end in themselves" states that: we should act in such a way that we always treat humanity never simply as a means, but always at the same time as an end (Kant 1785, p. 96). Kant says that people, as rational beings, have unconditioned and absolute value. This means that people are ends in themselves; their end or value is not relative, or dependent on another person's view of them. Therefore, in pursuit of ends which are relative to us, like our own happiness or success as scientists, it is wrong for us to use other people arbitrarily, simply as a means to our own ends. In the problems cited about health care, people were used as a means to the healthcare provider's ends, as objects or things in their scientific experiments. The formula of "end in themselves" is the limiting condition of every person's freedom of action.

The principle of respect for autonomy results from recognizing and respecting the ability of each rational person to not only be subject to the universal law, but also to be capable of making the law, i.e., self-rule. This means that each person has a free will, which allows individuals to choose their maxims, reasons for action, from the point of view of themselves and every other rational being. The principle of respect for autonomy has embedded the idea that all people are morally equal.

The principle of beneficence (and non-maleficence) can be seen as developing from the traditional Hippocratic medical oath (490?-460?-370 B.C.) (Chadwick and Mann 1950, Jones 1923) and from Mill's essay *On Liberty* (Mill 1859). The following passage of the Hippocratic oath gives the precursor to the modern principles of beneficence and non-maleficence and casts the health care professional in a trust relationship with the patient:

> I will apply dietetic measures for the benefit of the sick according to my ability and judgement; I will keep them from harm and injustice. I will not give a deadly drug to anybody, if asked for it, nor will I make a suggestion to this effect. Similarly I will not give to women an abortive remedy. I will not use the knife, not even on sufferers from stone, but will withdraw in favour of such men as engaged in this work.
>
> Whatever houses I may visit, I will come for the benefit of the sick, remaining free of all intentional injustice, of all mischief and in particular of sexual relations with both female and male persons, be they free or slaves. What I may see or hear in the course of treatment or even outside of treatment in regard to the life of men, which on no account one must spread abroad, I will keep to myself, holding such things shameful to be spoken about. (Chadwick and Mann 1950, p. 9)

The principle of beneficence (non-maleficence) is also stated in the *Epidemics* essay, where Hippocrates says: "Practice two things in dealings with disease: either help or do not harm the patient" (Chadwick and Mann 1950, p. 35). The problem with the Hippocratic tradition stems from the attitude toward the patient. First, in the *Epidemics*, Hippocrates says: "The physician is the servant of the science, and the patient must do what he can to fight the disease with the assistance of the physician" (Jones 1923, p. 36). I suggest the healthcare provider serves the person first. The *Decorum*, believed to be written after Hippocrates of Cos, describes the proper behaviour and attitude of the healthcare provider (Jones 1923). In particular, section XVI, describes a beneficent but paternal healthcare provider:

> Perform all this calmly and adroitly, concealing most things from the patient while you are attending him. Give necessary orders with cheerfulness and serenity, turning his attention away from what is being done to him; sometimes reprove sharply and emphatically, and sometimes comfort with solicitude and attention, revealing nothing of the patient's future or present condition. For many patients through this cause have taken a turn for the worse, I mean by the declaration I have mentioned of what is present, or by a forecast of what is to come. (Jones 1923, p. 297)

Mill was concerned with protection of the individual from the state or society. He argues that "the only purpose for which power can be rightfully exercised over any member of a civilized community, against his will, is to prevent harm to others" (Mill 1859, p. 73). Mill articulates further that individuals also have "many positive acts for the benefit of others which (we) may rightly be compelled to perform; to perform certain acts of individual beneficence, such as saving a fellow creature's life, or interposing to protect the defenseless against ill-usage" and "to make any one man answerable for doing evil to others is the rule" (Mill 1859, p. 74). Further, Mill states that "each is a proper guardian of his own health, whether bodily, or mental and spiritual" (Mill 1859, p 75).

As derived from Mill's (1859) *Utilitarianism*, where the general principle is to maximize the general good or happiness of society, i.e., to maximize pleasure and minimize pain, a person's illness can be seen as a source of pain and unhappiness, and the healthcare provider's role is to relieve the pain and unhappiness, and thereby promote the good or happiness (Kushner 1981).

Taken together, the *Hippocratic corpus* and Mill's thoughts can be seen as forming the core concept of beneficence and non-maleficence. Hence, the principle of beneficence asserts to help others further their interests by (i) preventing evil or harm, (ii) removing evil or harm and (iii) promoting good; and non-maleficence asserts to refrain from inflicting harm or doing evil.

The principle of justice may be thought of in terms of the debate on social justice, Kantianism vs Utilitarianism. In terms of Decision Theory the debate is considered as "decision under ignorance" (Resnik 1987). Rawls (1958, 1971) develops a conception of justice: justice as fairness, derived from Kant's deontological position. Rawls argues for a conception of justice that protects the interests of those on the bottom of the social ladder, following the "maximin rule" in decision theory - maximize the minimum payoff (Resnik 1987). Rawls compares different societies that would result from different rules of justice and argues that the society that guarantees the highest level of goods and services to the people on the bottom of the social ladder is the most just.

In contrast, a utilitarian conception of justice, conceived as the aggregate well-being of all members of a society, is the average amount of goods and services realized by all individuals (Resnik 1987). This position implies that some individuals at the bottom of the social ladder may not have any particular goods, like health care, even though the aggregate of the whole society is not zero.

In summary, contemporary biomedical ethics has developed from a blend of classical ethics with liberal individualism, Kantianism and Utilitarianism. The principle of respect for autonomy develops from Kant, the principles of beneficence and non-maleficence develop from a blend of the *Hippocratic oath* and Mill, and the principle of justice from the debate on social justice. The principle-based approach describes the "voice of reason", typically characterized as the traditional male voice of abstract ethical theories. Its ethical precepts are generally universal accounts, offering a deductive approach to moral problems.

2.4 Relational Ethics[3]

What is relational ethics? Gilligan (1982), in her work on moral relationships, describes an ethical voice distinct from the traditional "voice of reason", or the ethic of justice, which she terms the "voice of care". The voice of care originates in a particular context; it is the voice of specific individuals in relationship with one another. Gilligan says that "while an ethic of justice proceeds from the premise of equality - that everyone should be treated the same - an ethic of care rests on the premise of nonviolence - that no one should be hurt" (Gilligan 1982, p. 174).

In similar fashion, Raymond Duff, a pediatrician, has described these two perspectives in terms of ethical views: "close-up" and "distant" (Duff 1987). "Distant ethics" refers to the application of abstract ethical principles and how they may be applied to solve moral dilemmas in health care. Duff's "close-up" ethics acknowledges the importance of feelings and living conditions of the sick and attends to the specifics of the family and religious or philosophical orientations that serve as the foundations for individual and family life in particular situations.

Relational ethics challenges the principle-based ethical paradigm. By considering "Who is the individual of concern?" in these ethical perspectives, the relation between principle-based bioethics and relational ethics can be made clear. The ethical theories of Kant, Mill and Rawls are about abstract or generalized individuals: the subject of the theory is an abstract person - someone who we cannot in principle know in any detail, not being a specific individual in a specific context. For example, in *A Theory of Justice* (Rawls 1971), Rawls argues that principles of social justice must pass a fairness test. The test is that the principles be founded on what rational, self-interested individuals would choose if behind a "veil of ignorance". The veil of ignorance is a theoretical tool, behind which a person (in the company of other likewise veiled persons) determines the principles securing a just society without knowing what their social status would be in that society. From this position, a person is thought to be able to rationally decide what in principle is just. This view of the rational agent is distant, entirely removed from the often irrational contexts of the world. The principles of justice which result are hypothetically impartial, applying equally to everyone. Individuals then choose a framework for a just community by generating rules made to govern all practices.

The relational ethics approach developing from Gilligan (and many others), is person-specific; relationships and contextual details take precedence. According to Gilligan, justice cannot be imposed on people or the world; rather, it is the experiences of inequality and interconnection that give rise to the critical importance of relationships. Gilligan challenges the universal account of justice by arguing that "only when substance is given to the skeletal lives of hypothetical people is it possible to consider the social injustice that their moral problems may reflect and to imagine the individual suffering their occurrence may signify" (Gilligan 1982, p. 100). Carse (1991) has similarly described justice not in terms of self-interested individuals, but individuals specifically attuned to their relationships with others, attentive to their needs, partial to the other.

Dillon (1992) develops the concept of care respect. She claims that in Kant's account, the "morally significant feature of persons is the capacity for rationally autonomous moral agency" and respecting this involves "keeping our distance from others" (Dillon 1992, p. 113). Dillon points out, moreover, that we must depend on others for help in satisfying our needs; indeed, for our very existence and development. Therefore, respect requires "not so much refraining from interference as recognizing our power to make and unmake each other as persons" (Dillon 1992, p. 116). Bauman (1993) claims further that moral phenomena are non-rational, are not regular and repetitive, nor conveniently captured by rules of practice (see section 1.5.3). The seed of morality arises from competing moral impulses found in the particular moment in relationship with another person.

The two perspectives are conceptions of moral reasoning that coexist to define what is ethical (Gadow 1995). The principle-based account is implicitly deductive, or top-down, providing solutions to categories of moral problems in health care from abstract principles, and then applying the solutions to the world. In contrast, with relational ethics, moral decision-making is within the specific case and for this reason the moral approach is inductive, or bottom-up. The inductive approach is typified by the casuistry model presented by Jonsen and Toulmin (1988).

Sherwin (1996) suggests that most bioethical arguments reflect a belief that the insights of theoretical ethics can be effectively modified in the light of actual experience and circumstances. Beauchamp and Childress (1994), in their fourth edition, acknowledge that the contextual or relational ethics provides a needed corrective and that moral reasoning is two way, a reflection between deductive and inductive approaches.

However, Winkler (1993) points out that this reflection is currently not part of ethical practice.

Thus, inherent to relational ethics is a dialectic between the ethical approaches of justice and care (Gadow 1995). Each approach coexists with the other and provides only a partial solution. Accordingly, relational ethics may be considered as a blend of the two voices, the ethic itself being developed from hearing the sound from an ear to each voice; alternatively, an ethic derived from reconciling the close-up and distant views, an eye on both the distant and close-up worlds. This relational ethic results from actual dialogue with the public, where ethical solutions are created through our relationships by developing a joint narrative of the situation in which each individual is involved. Therefore, the onus for ethical practice is placed on each individual. It occurs through communication with the public, as well as with each other as healthcare providers.

Principles in ethics function much as they were envisioned by Aristotle (384-322 B.C.) (1941). The principles guide action generally; they are not fixed and they provide only a general guide to ethical action. The principles must conform to the contextual details of the particular case, and "the agents themselves must in each case consider what is appropriate to the occasion" (Aristotle 1941, p. 953). This account of principles is not much different from that envisioned in principle-based ethics, but the notion that distinguishes relational ethics is how the agents themselves consider what is appropriate in each case. The contextual details, and the particular meaning of the principle, are defined within the healthcare provider-person relationship through dialogue. The dialogue is a joint ethical narrative between the healthcare provider and person, where mutual understanding and meaning are developed through the experience of the particular and are the goal of the dialogue (Gadow 1995).

In health care, the providers are directly involved with those in need; that is, the people come to the healthcare providers, which gives real opportunity for dialogue. The concept of informed consent provides the practical focal point for ethics and ethical communication for the practice of health care in general. Likewise, public health practitioners are asking for a concept of informed consent (see section 1.2). The problem for public health is that there is not a direct link with the public through the experience of health or the burdens of ill health. In fact, the critical problem is building the relationship with the public such that dialogue on health may take place. A process of informed consent is needed to provide a focal point for ethical public health risk communication. From an analysis of the concept in medicine, an outline for the concept in public health can be developed.

2.5 Informed Consent: The Act and the Process

Informed consent can be conceived of in two ways: as an act and as a process (Lidz et al. 1988). As an act, it has been discussed in the literature as key single events, such as the actual signing of the informed consent document that gives formal permission for the healthcare provider's intervention. Generally, this has been described primarily as a contract between the person and the physician. In the process conception of consent, the focus is on the entire healthcare encounter, not merely any specific act. Consent as process occurs through every particular healthcare activity, and in turn, every activity influences the consent of the person. In the process account the emphasis is on the relationship between all healthcare providers, the person and their family. Both of these perspectives need to be considered in relation to one another for a comprehensive account of informed consent.

Risk communication is fundamentally different in the two accounts of informed consent. As an act, risk communication can be considered a one-time transfer of information over a short period of time, about harms and benefits to a subject for the purpose of decision-making. As a process, risk communication shapes the relationship and structures the very practice of the health care. In a process view, risk communication is modeled after discourse ethics rather than the isolated moments of information transfer.

Informed consent from a relational ethics account must consider both the act and the process.

2.5.1 The Act of Informed Consent

The primacy of beneficence, as part of the traditional principles of medical ethics, has been challenged by increasing concern for personal autonomy. The principle of respect for autonomy asserts that people must be considered as ends in themselves, not just as a means to some other end, such as the public good or the research goals of healthcare researchers. To prevent people from wrongful harms that may result, the principle of autonomy asserts a person's rights, as embodied in the doctrine of informed consent, to refuse or to accept treatment.

Faden and Beauchamp (1986) view informed consent and refusal as particular actions; the goal of informed consent is to enable people to perform these actions, making autonomous choices about whether to authorize a medical intervention. A person is said to have given their informed consent for a health care intervention if: (i) the person receives a thorough disclosure regarding the intervention; (ii) the person comprehends the disclosure; (iii) the person acts voluntarily in consenting; (iv) the person is competent to give the consent; and finally, (v) the person actually consents. Faden and Beauchamp (1986) distinguish informed consent into two types: (i) autonomous authorization, consent as a kind of action by specific individuals, and (ii) effective consent, in reference to legal standards, cultural and policy rules that collectively form the social practice in institutional contexts.[4]

With respect to informed consent documents, there are two major questions that surround the act of signing: (i) Did the person sign without another's controlling interest, such that signing the informed consent document was an autonomous action? (ii) Was the person competent enough to comprehend the document? Faden and Beauchamp (1986) approach these questions in two ways: first through a discussion of autonomy, and second, through definition of the three types of risk communication that define disclosure - coercion, persuasion and manipulation, in addition to imparting information which the other comprehends.

Acts are viewed as autonomous if they satisfy three basic conditions: intentionality, understanding, and the absence of controlling influences. The ideal autonomous act would be an intentional action that is fully understood and completely uncontrolled by the influences of others. Faden and Beauchamp (1986) claim that because this ideal is never attained (as actions are autonomous by degrees), the more we understand and the less we are controlled, the more autonomous our actions will be. They argue that the goal in medical decision-making should be substantial autonomy, where the surrounding context of the decision determines exactly what constitutes substantial autonomy.

Historically, in the *Canadian Journal of Public Health*, Hague (1929) (see section 1.5.2) distinguishes ethical risk communication as an issue of persuasion, as opposed to coercion.[5] Faden and Beauchamp (1986) fill the middle ground by distinguishing forms of manipulation. They describe manipulation as "the catch-all term for communication that is neither coercion nor persuasion; intentional and non-successful non-coercive influence altering the available choices of an individual, or a perception of those choices and influence that does not appeal to reason" (Faden and Beauchamp 1986, p. 261). The essence of manipulation is having people unwittingly do what the manipulator intends for them to do. With respect to informed consent, the objective is to provide enough information to the person and help in understanding, such that the possibility of the person being manipulated is significantly reduced.

Criticism of the informed consent doctrine and the notion of autonomous actions generally focuses on the ability of the person to meet the criteria for informed consent, in particular the ability to comprehend the disclosure (Herz et al. 1992, Zussman 1992). Drane (1985) presents a sliding scale model that attempts to define the stringency of the assessment of competency or comprehension in particular decision contexts. Essentially, as the seriousness of the consequences of the person's decisions increase, the criterion of substantial autonomy becomes more strict; or, in short, the greater the risk the stricter the standard of competency to be applied. Morgan and Lave (1990) also present a sliding risk scale approach to distinguish when risk communication should be manipulative. They assert that in cases of large risks there is universal agreement that the public should be manipulated so as to induce the behaviour desired by the risk communicator.

On the surface, Drane's (1985) sliding standard seems reasonable. It suggests an increasing standard of competency with severity of risk, designed to promote the person's best interest and to prevent harm to the person. However, the only time this standard of incremental competency needs to be applied is when the person, for whatever reason, disagrees with the healthcare provider and refuses to consent.

The problem with sliding scale models in general is that they tend by default to give healthcare providers the power to define the situation based on their own values and conceptions of risk, and to define the standard of the person's competency or determine when the public need be notified or involved in decision-making. Roberts (1996) argues that those same power relations which exist in society at large (e.g. social class, cultural, gender and racial) are reproduced within healthcare culture. These inequalities influence treatment decisions and the way people are both perceived and treated by healthcare providers. To one degree or another, the healthcare provider brings to the health care encounter any or all the prejudices, inequalities and cultural biases that exist in the rest of society (Vineis 1995, Roberts 1996). The sliding scale model allows for the reproduction of inequalities to continue by maintaining in the healthcare providers the power to determine the conditions of the decision-making context, if not the formal power to decide themselves. Therefore, the sliding scale model of informed consent does not protect vulnerable individuals from forced treatment, and it does not prevent vulnerable individuals from making uninformed decisions. The sliding scale model leaves informed consent as a token symbol of authorization in situations where the healthcare provider deems there is little difference in risk either way, or when the person unassumingly agrees with the healthcare provider's opinions. Moreover, it assumes that the deontological weight of healthcare ethics should be determined by the nature of the outcome.

The point of autonomy is to allow the person's own values to shape healthcare decisions. The legal interpretation of this goal is to offer the "reasonable patient" standard, as determined by the courts or physicians. Robertson (1991) suggests from a review of 117 Canadian cases since the paradigmatic case of Reibl vs Hughes in 1980, that the impact of informed consent legislation has been very minimal in actual frequency and severity of malpractice suits, but that the case has nonetheless had symbolic importance, especially with respect to risk communication within the physician-person relationship. The symbolic importance is in three general theoretical areas: (i) if a physician fails to inform the person of material risks associated with proposed treatment, this failure gives rise to a cause of action in negligence; (ii) the standard of disclosure is to be measured by what a "reasonable person" in the person's position would want to know, rather than what a reasonable physician would decide to disclose; and (iii) for there to be a causal link between the physician's failure to disclose the information and the person's injury, it must be shown that the information would have had an effect on the person's decision to undergo the treatment. The critical problem lies in determining what is a "reasonable patient".

Veatch (1995) argues that there is no reason to believe that a physician (or healthcare provider) can guess what is in the person's best interests, or determine what a "reasonable person" is, and the notion that "a physician or any expert in only one component of well-being should be able to determine what constitutes the good for another being" is critically flawed. Similarly, Goldie (1982) suggests for better or worse, that when healthcare providers speculate about persons' interests, "their judgement is based on fantasy, usually generated by putting themselves in the patient's shoes" (Goldie 1982, p. 130). A recent study on informed consent has demonstrated that presenting balanced information to people results in a broad range of responses, and that most medical decisions are not just medical, but include a wide variety of other values (Wolf et al. 1996). Roberts (1996) suggests the solution lies in improving health risk communication within the healthcare provider-person relationship itself.

This brings health risk communication to the centre of importance for informed consent. In the act of informed consent, risk communication is based essentially on an information transfer model (Smith 1996). Typically, information is presented to the person shortly before administration of the treatment, and the person then makes a decision based on the information. Faden and Beauchamp (1986) argue for substantial non-control of decisions. In contrast to Morgan and Lave (1990), Faden and Beauchamp (1986) argue that ethical health risk communication is persuasion or, at worst, unintentional manipulation since it cannot be avoided.

Unintentional manipulation may occur through several avenues. Informational manipulation occurs when the structure of perception of choices is altered by managing information so as to promote a desired action (Faden and Beauchamp 1986). Tversky and Kahneman (1981) demonstrate that by framing information in particular ways (for example, in the health context, the probability of dying or living from a given procedure) the choices that people (including healthcare providers) make can be directed to a significant degree. Therefore, when mere "information" is presented, the presentation itself will contain the danger of manipulative elements, and there is a need to recognize this dilemma and confront it with the aid of the person.

Further, to varying degrees non-substantive elements like tone, manner and order, word choice, time and setting, and the appearance, style, and charisma of the presenter can be forms of psychological manipulation (Faden and Beauchamp 1986). The literature on successful communication techniques contains non-substantive elements as described for psychological manipulation (Ong et al. 1995, Covello 1993, Covello 1995). Communication techniques developed by Covello (1993) for public health are designed to use these non-substantive elements as tools to create the perception of trust in the risk communicator, as a means to having risk messages accepted. For informed consent, the criterion is substantial non-control, and Faden and Beauchamp (1986) advocate that healthcare providers seeking informed consent should eschew altogether the use of psychological and informational manipulation.

To avoid these pitfalls, informed consent must be reconceptualized in terms of relational ethics. This would result in a change from considering informed consent only as an act to a broader notion of comprehended choice based on the values of the person expressed in relationship with healthcare providers as a process (Gadow 1995, Smith 1996). Smith (1996) argues that we must move away from risk communication as simply another name for information transfer. This latter emphasis shifts the focus of communication from a single incident (or even a series of isolated acts) to communication through the entire healthcare relationship. That is, the focus of communication becomes comprehensive and ongoing rather than an isolated act.

2.5.2 The Process of Informed Consent

The process account of informed consent is grounded in the healthcare provider-person relationship throughout the healthcare encounter and is more amenable to the concept of relational ethics. The process perspective does not diminish the significance of the act of signing the informed consent document to satisfy legal requirements, but recognizes that many elements of consent lead up to and follow after the signing of the document (Lidz et al. 1988). From the moment a person enters the tertiary referral system and begins a dialogue with healthcare providers about treatment options, they must sign a general consent for "routine care and procedures" (Gurnham and Butler

1994). The person will have already consented to many kinds of procedures and examinations before reaching the critical decision when a more tailored legal informed consent form is required. Consent is assumed with each communication, unpronounced and yet implicit in every eye and hand gesture, every interaction between the provider and the person.

In the process model, questions about risk communication shift from primary concern about coercion or persuasion to that of understanding and discovery, as one between a trusted provider and the person; it provides the opportunity for the healthcare provider to know and acknowledge the needs of the person and to consciously meet those needs. After all, risk communication is about encouraging a more complete comprehension of the situation, the pain and pleasure, the harm and benefit produced and experienced through the relationships encountered in the healthcare system.

Veatch (1995), in reference to routine blood drawings, says that the mere extending of an arm should count as an adequate consent. What must be recognized, however, is that it "isn't just any arm"; it is a particular person's arm, and "the mere extending of the particular person's arm" should indicate a shared understanding between the healthcare provider and the person, a consensus that blood will be respectfully drawn, used only in the interests of the extender of the arm, and that this is an acknowledged part of the treatment (Gadow 1995). Without this consensus, people would not extend their arm for that purpose, and so the extension of their arm becomes a signal that their goals are consistent with the established treatment program. On the first drawing of blood, formal risk communication must take place, namely that blood needs to be drawn as part of the treatment, such that an act of informed consent is required as a matter of process. Further, if the person does not extend their arm, there is no longer consensus. This shifts the situation to a key incident, an "act" which signals that the person's goals have to be re-evaluated and that the situation needs to be more formally discussed. The key point is that the norms of practice are openly cultivated by the practice.

Veatch (1995) suggests that many routine procedures can be done without overt consent; that tacit consent can be presumed. In contrast, Smith's (1996) approach grounds every action in consensual agreement, where nothing is presumed, and the critical difference is seen in the conception of the person being in a social context with the healthcare provider. People are not objects or machines, engines whose oil can be checked periodically without notice. The social context of the health care setting requires the healthcare provider to acknowledge the person. Further, because understanding and agreement are fundamental, power inequality becomes more visible. The essence of the process concept of consent is that consent occurs within the relationship; that it is a constituent of it and not merely a result.

As just described, the process does not replace the act of informed consent, but works in conjunction with it. Smith (1996) suggests that the relationship of healthcare provider with persons must "begin with consensus sessions on ends and values of treatment, then move to specific calculations on strategies to achieve specific goals" (Smith 1996, p. 191). The process model views the facts and values of both the person and the healthcare provider as developing throughout the health care encounter. The act becomes more prominent when there is disagreement, or when new facts become known, such that a change in treatment is necessary.

A key point of the process approach in contrast to the act of informed consent is that the relationship is not focused solely on the physician, but on all healthcare providers in general: nurses, physicians, counselors, technicians, and so on. Tabak (1996) discusses the problems created by a physician-centered informed consent act, in that nurses are inevitably drawn into the relationship when the person wants more information, or feels inadequately informed.

Likewise, Kuczewski (1996) claims that informed consent has focused exclusively on the person as isolated from their family, such that the family's interests are cast as being in conflict with the person, whereby there arises the question of personal rights and family rights. Kuczewski (1996) advocates that we develop the view that the point of the process of informed consent is to develop personal autonomy, in which the family and healthcare providers play an important role in assisting the person with understanding and expressing their values and goals. The essence of the process account is to see the relationship of the person and healthcare provider embedded within other relationships; for example, the person in relation with their family and friends, and the healthcare providers in specific relationship with each other. Therefore, models of the healthcare provider-person relationships need to be reconsidered to facilitate the process account of informed consent, because the traditional models assume a diffuse acceptance of the physicians' authority to direct treatment and the person's (not to mention that of the family's) obligation to cooperate (Lidz et al. 1988).

2.6 Healthcare Provider-Person Relationships

The ethical characterization of the relationship between the healthcare provider and person profoundly affects the practice and norms of risk communication as they serve to shape attitudes and behaviour in healthcare providers. The paternalistic model from the *Hippocratic corpus* advocates to "conceal most things from the patient while you are attending to him, revealing nothing of the patient's future or present condition" and has dominated health care for centuries (see section 2.3). Laine and Davidoff (1996) argue that this conception was supported by Holmes in 1871, and it was not until 1956, when Szasz and Hollander (1956) presented a different conception of the relationship that attitudes slowly changed. In 1961, a survey revealed that 90% of physicians preferred not to reveal to their patients a diagnosis of cancer (Oken 1961), and in 1979, attitudes had completely reversed, with 97% of physicians preferring to disclose a diagnosis of cancer (Novack et al. 1979).

My purpose in describing different models is to provide a framework in which healthcare providers can begin to think of their relationships with people and their families, and to think about the meaning of fostering autonomy as a concept. The model provides a basis for developing the relationship between public health practitioners and the public.

In the following sections I describe three general relationships. First, where authority is vested in one person, the "healthcare provider stand-alone/paternalism-beneficence model" is presented, and then contrasted with its opposite, the "person stand-alone autonomy model". I subsequently develop a third model which fills the middle ground, where neither the person nor healthcare provider are alone.

There are several traditional models that discuss the relationship as a physician-patient relationship. However, persons tend to interact to a much greater degree with other healthcare staff, and predominantly with nurses and nurse's aides (Wolf 1996). The models use the term "healthcare provider" to express the relationship of the person in all health care settings, in keeping with the process account, and emphasizes that risk communication takes place continually throughout the time a person is being cared for.

2.6.1 Healthcare Provider Stand-Alone/Paternalism-Beneficence Model

Healthcare provider stand-alone / paternal-beneficence means that the healthcare provider makes all decisions and the person has no voice to express preferences. The person is completely subservient to the healthcare provider. According to Szasz and Hollender (1956), this is the oldest conceptual model of the relationship and is applicable most clearly for acute care. The healthcare providers “assume they know” the person's preferences and that they know how to promote the good of the person. In this model, the healthcare provider is explicitly cast as the absolute authority; the preferences of the person are not overridden as they are not even determined. The model is envisioned as strongly paternalistic. It usually excludes non-physician healthcare providers.

The model is most seductive in emergency encounters, especially in acute cases where the person cannot respond (Zussman 1992) and in cases where the person is virtually incompetent and has no family. The model is justified where intervention is required immediately to save the person's life. Kushner (1981) has challenged the model by asking how often it is justified. Kushner analyzed the National Ambulatory Medical Survey of 1973 and found that "in roughly half of ambulatory encounters (100 cases) with their general practitioner, the patient has an illness in which there is objective evidence of physical pathology", and in "15 of 50 this is a problem that may result in significant impairment or death if left untreated" (Kushner 1981). Therefore the number of occasions where healthcare providers may consider the situation as one where they simply apply an expert technique that they have learned in medical school is limited. The inherent uncertainty in the majority of medical encounters removes grounds for a claim of absolute authority by healthcare providers. This has led Kushner (1981) to suggest that a relational model is required to describe the relationship between healthcare providers and people.

A second problem refers to the treatment of people under this model. Consider a clinical encounter where a person arrives at the hospital with a common clinical problem like a broken hand. The healthcare provider can treat the hand as just any broken hand and thus does not have to think too deeply that it is some "person's" broken hand. The provider can simply X-ray the hand to determine where it is broken and decide to place the hand in a plaster cast with minimal consultation with the person.

There are two basic objections to this conception. The first objection concerns its reductionist view of the person. The healthcare provider, by considering that the broken hand is some particular person's hand, and not just any broken hand, sees the person not simply as being composed of parts where they are required just to treat the hand. Rather, the healthcare provider should be treating a person, who happens to have a broken hand. The distinction is in treating persons as ends in themselves.

The second objection is that the healthcare provider cannot respect the other ethical principles with this model. For example, if the person with the broken hand were a musician and required the hand desperately for the performance of their art, then a broken hand is not just any broken hand, but could mean the end of the person's career. In this case, the person may have special needs and may require special care with the healing of the hand. Simply placing the hand in a cast that immobilizes it for six weeks may not be the best option for the musician. Perhaps a special cast may be designed that will enable the person to have maximum flexibility in the fingers to allow for a different type of healing. The key point is that the healthcare provider cannot assume knowledge of the feelings and thoughts of the person beforehand and therefore cannot inherently know what is best for the person. The healthcare provider cannot give the person the treatment they deserve, but only the treatment they feel the person deserves.

In ethical terms, the healthcare provider stand-alone / paternalism-beneficence model emphasizes healthcare provider authority over the principle of patient autonomy. But the ethical principles of non-maleficence, beneficence and justice must be thought of with respect to the person. These principles can only be respected if the voice of the person is heard. Therefore, personal autonomy must be respected if the person's needs and indeed their rights, are to be respected.

2.6.2 Person (Patient or Client) Stand-Alone Autonomy Model

At the opposite extreme from the healthcare provider stand-alone / paternal-beneficence model, the person is given the position of absolute authority. This authority gives people domain over their bodies and the right to decide which interventions or treatments will be used. Under this model, the principle of personal autonomy is the primary principle, trumping non-maleficence, beneficence and justice. The healthcare provider collects information to diagnose the problem under the direction of the person, and the results are presented to the person along with alternative treatments. The healthcare providers otherwise stand by silently, promoting no values or preferences. The model typifies what may be considered ethical neutrality. This is the position of nondirective genetic counseling (Seller 1982), consumer and engineering models of health care (Gadow 1996, Deber 1994) or neutral risk communication (Morgan and Lave 1990).

The person stand-alone model insists that all persons are treated equally, in that all people have complete control over their medical decisions regardless of their individual competence. There are several objections to this model. First and foremost, will people be able to realize the full expression of their autonomy? Further, assuming that people know their real interests, would they be able to fully realize their autonomy under the duress of their health condition? The essential problem is that everyone, healthcare providers included, have differing potentials of realizing their autonomy, even without the duress of a health condition. If people cannot fully realize their autonomy, they may not be capable of assimilating all the risk information into a coherent conception of their health condition, such that they can diagnose and weigh the harms and benefits, future pains and pleasures of the various treatment options. Under this model, the healthcare provider stands by, silent, neutral, implementing poor treatment decisions as conducted by the person. The situation begs the question: Is such neutrality ethical?

Common sense would say that neutrality is not ethical here, and that healthcare providers have an obligation to help persons make decisions, an obligation to foster autonomy. This may be especially important when confronting a difficult person, where communication is very confrontational; a healthcare provider might like to relinquish all responsibility to the person, and let the person stand-alone as a means to escape from the difficult situation.

In ethical terms, the person stand-alone autonomy model places more emphasis on the autonomy of the person than on the principles of healthcare provider autonomy, beneficence, non-maleficence and justice. It would be unjust that persons should suffer because they could not fully realize their autonomy. If person stand-alone autonomy takes precedence over beneficence and non-maleficence, a healthcare provider may harm a person, and not promote the good or prevent harm. Thus, a healthcare provider cannot support the principles of beneficence and non-maleficence under this model. In other words, healthcare providers require some autonomy of their own to promote the principles of beneficence, non-maleficence, and justice.

2.6.3 Fostering Autonomy Through Mutually Respectful Relationships

The healthcare provider and person need to be considered as being in a relationship as individuals brought together in a medical context, where the autonomy of each individual must be respected. Fostering autonomy through mutually respectful relationships means that the ability of the person and the healthcare provider to participate jointly in the relationship is maximized, and that through engagement which allows for an expression of values, all parties may realize their autonomy. The ideal would be the consensus approach as described by Smith (1996). Persons lead in discussing their values, goals, and symptoms, and the healthcare provider leads in discussing the potential options and treatment strategies (Ong et al. 1995). What is emphasized is that, through engagement, the partial knowledge of both healthcare providers and the person are expressed and brought together; the integration of the two different perspectives is required for a complete picture. Thus, the healthcare provider is both teacher and student, and so to the person. Neither can assume the other's knowledge, and ethical treatment is dependent on bringing the different subjective conceptions into one conception that they can share mutually in relationship. Fostering autonomy means "to foster conditions that widen the horizon of others and give them command of their own powers, so that they can find their own happiness in their own fashion" (Dewey 1947, p. 460). Absent this attitude of fostering, Dewey somewhat cynically continues: "Otherwise the prayer of the freeman would be to be left alone, and to be delivered, above all, from reformers and kind people" (Dewey 1947, p. 460).

The relationship should not, however, be conceived as two equal partners participating in healthcare decisions, but as an asymmetrical relationship created by the very nature of the health care context. Persons, by virtue of their health condition, are vulnerable and in need, and therefore have sought the expert skills of the healthcare provider. Healthcare providers, by virtue of their education and training, have expert skills that the person seeks. Therefore, there is an inherent asymmetry. Fostering autonomy through mutually respectful relationships acknowledges this asymmetry, recognizes the vulnerability of persons and the inherent power of the healthcare providers.

The relationship is asymmetrical in an ethical manner as well. The moral duty of the healthcare provider is to be there for the person, as an advocate for the person, whether the person is there for the healthcare provider or not (Bauman 1993, Gadow 1996). In terms of ethical practice, the ethical principles and guides are most expressly for the healthcare providers, not for the person; they guide the healthcare provider's actions in their relationship with the person.

There have been several models presented in the literature which fall under the fostering autonomy through mutually respectful relationships model. Each of the models assumes different disease mechanisms and is applicable to different types of cases. As an introduction to the issues involved, Szasz and Hollender (1956) describe two models: guidance cooperation and mutual participation. The prototype of the guidance - cooperation model is the parent-child (adolescent) relationship, and the model is applicable to most situations in medicine like postoperative care and acute infections. The prototype of the mutual cooperation model is an adult-adult relationship, and the model is applicable in most chronic disease situations.

Emanuel and Emanuel (1992) argue that a deliberative model, where they conceive of autonomy as moral self-development, should be the model for health care. The prototype of their healthcare provider is the caring provider and that of teacher or friend. Emanuel and Emanuel's model develops from the Socratic tradition (470-399 B.C.) rather than the Hippocratic tradition (460?-430?-370 B.C.) (see section 2.3)

(Toombs 1988). They reference Plato's account of the healthcare relationship as an example of the deliberative model:

> Athenian: ... Just as one type of physician treats us, when we call him in, in one way, and a second another - but let us remind ourselves of the difference between the two methods, and then we shall have a request to make of our legislator, as children might beg their physician to give them the kindest of treatment. You would like an illustration? Well there are physicians, and again there are physicians' assistants, whom we also speak of as physicians.
>
> Clinias: Just so.*
>
> Athenian: Now have you further observed that, as there are slaves as well as free men among the patients of our communities, the slaves, to speak generally, are treated by slaves, who pay them a hurried visit, or receive them in dispensaries? A physician of this kind never gives a servant any account of his complaint, nor asks him for any; he gives some empirical injunction with an air of finished knowledge, in the brusque fashion of a dictator, and then is off in hot haste to the next medical ailing servant - that is how he lightens his master's medical labours for him.
>
> The free practitioner, who for the most part, attends free men, treats their diseases by going into things thoroughly from the beginning in a scientific way, and takes the patient and his family in his confidence. Thus he learns something from the sufferers, and at the same time instructs the invalid to the best of his powers. He does not give his prescriptions until he has won the patient's support, and when he has done so, he steadily aims at producing complete restoration to health by persuading the sufferer into compliance. Now which of the two methods is that of the better physician or director of bodily regimen? That which effects the same result by a twofold process or that which employs a single process, the worse of the two, and exasperates the subject?
>
> Clinias: Nay sir, the double process is vastly superior.
> (Hamilton and Cairns 1961, The Laws IV, p. 1310, lines 720c)
> * we deleted one exchange

The double process is an example of the Socratic dialogue, or dialectical method. This example is taken from the *Laws*, written at the end of Plato's life, and it is worthy to note that Plato no longer puts his thoughts in the mouth of Socrates, as is generally the case (Toombs 1988). For Socrates, teaching and learning are inseparable; both occur in the context of communication. Teaching involves learning through reaching consensus, not just producing one, because consensus alone is no sign of veracity if coerced or manipulated.

2.7 Conclusion

This chapter argues that relational ethics is a synthesis of the principle-based biomedical ethics paradigm that emerged in the mid-twentieth century with the ethic of care. The concept of informed consent was analyzed from a relational ethics perspective. Consent should be reformulated as a process rather than as a specific act in order to conform more to the concept of relational ethics. Recasting informed consent as a process requires a change in the conception of health risk communication as one based on an information transfer model to one of communication based on discourse ethics. With this change, the nature of the healthcare provider-person relationship needs to be recast. An argument was developed to demonstrate that the healthcare provider-person relationship should be based on fostering autonomy through mutually respectful relationships.

The critical problem for public health is that there is not a direct link with the public through the experience of health or the burdens of ill health. Therefore the relational ethics framework needs to be developed further with this consideration. This problem can be approached by grounding relational ethics in Socrates (470-399 B.C.) rather than in the paternalistic tradition of Hippocrates (460?-430? -370 B.C.).

Socrates provides an excellent model for public health practice as he had the perspective that distinguishes public health practice; he went into the community to discuss risk: Socrates' office was the community streets and he knocked on the door of the public. Socrates' ethic was "person centered" like Gilligan's (1982), and the principle of respect for autonomy develops from Socrates' principle "think for yourself" cf. (Kant 1784). The concept of fostering autonomy develops from this principle and Socrates' activity of promoting this principle in the Athenian community. Development of a relational ethics framework for public health risk communication, with its roots in Socrates, will be the focus of chapters 3 and 4.

Notes

1. (section 2.1) We use the designation "person" as opposed to subject, client, consumer or patient to allow for maximum interpretation of the relationship, and to show maximum respect of the person seeking health care.

2. (section 2.2) The "hole in the ozone layer" is not a correct scientific term, as the hole is actually a thinning of the ozone layer. Recently, Federal government scientists reported that the ozone layer over Canada has reached a new low, as much as 45% thinner than normal at this time, since monitoring began in the 1960s.

3. (section 2.4) Some authors draw important distinctions between the ethics of care and Relational Ethics. We do not make this distinction and prefer the term relational ethics. This usage avoids some of the difficulties inherent in the word "care", with its many poorly defined shades of meaning, and its poorly articulated ethical system.

4. (section 2.5.1) However, there are other acts that are just as significant as the signing of the legal form. The clearest examples are from surgery where patients, before entering surgery, must sign on their body with a felt marker where they would like the surgeon to operate. For example, patients having knee surgery mark on their body "YES" on the knee they want operated upon, and a further "NO" on the other knee. This is a practical measure to prevent surgeons from operating on the wrong part of the person's body.

5. (section 2.5.1) By definition (Faden and Beauchamp 1986): "persuasion is restricted to influence by appeal to reason, the intentional and successful attempt to induce a person, through appeals to reason, to freely accept - as his or her own - the beliefs, attitudes, values intentions or actions advocated by the persuader" (Faden and Beauchamp 1986, p. 262). Coercion occurs if someone "intentionally and successfully influences another by presenting a credible threat of unwanted or avoidable harm so severe that the person is unable to resist acting to avoid it" (Faden and Beauchamp 1986, p. 339).

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2

Chapter 3: Causal Relationships and the Ethics of Public Health Risk Communication

3.1 Introduction and Overview

3.1.1 Socrates: The Root of Public Health

This chapter extends the discussion of relational ethics from the previous chapters to public health risk communication for chemicals in the environment, with the focus on the development of health advisories (Chapters 1 and 2). In brief, bioethics discussion has been intense since the early 1960s when the Hippocratic ethical tradition was first challenged (Pellegrino 1993). This chapter works toward recasting the root of relational ethics and public health activity, both science and ethics, in Socrates (470-399 B.C.). Socrates' perspective provides the seed of both science and ethics and it can be grown for our times.

Note that Socrates did not write, but his character has been preserved in the writings of Plato (428-327 B.C.) and Xenophon (434?-355? B.C.) (see Introduction). Similarly, the Hippocratic medical tradition is a loose collection of writings from various sources, medical schools, and times, claiming Hippocrates of Cos (~460 to 430-370 B.C.) as their master, and should not be attributed solely to Hippocrates of Cos, the actual person (Jones 1923, Heidel 1941). Thus, for both Socrates and Hippocrates, we face risks in determining and claiming what they actually thought.

In science, the fundamental principles of toxicology, the threshold and dose-response relationship, the "metaphor of the plant and seed" to describe the relationship between the organism and the environment, and the scientific attitude, all stem from Socrates. Hippocrates is generally considered a founder of western public health practice, developing the concept of prevention and maintenance of health through the fundamental public health care activities of diet and fitness (Heidel 1941).[1] However, Socrates also discusses the importance of diet and fitness in care of the self, and argues for exercises to improve health of the body as a whole (Xenophon 1990, Memoirs of Socrates 1, p. 73) (see section 4.2).

Heidel (1941) argues that Hippocrates of Cos was in keeping with the teaching of Socrates and that Plato's reference to Hippocrates of Cos in his dialogues is not accidental: "His name typifies that rational procedure in the field of medicine which Socrates demands in the theory and practice of oratory. The definite statement that the art of medicine and the art of oratory are approximately the same is the key to the whole discussion; and though it is not expressly stated that Hippocrates and reason are in full accord, one is left with the impression that to the mind of Plato they are" (Heidel 1941, p. 12).

As presented in the closing of the last chapter, the art of oratory for Socrates is not speeches but dialogue, the "double process" (see section 2.6.3). For Socrates, dialogue is the means of testing ideas and is germane to a scientific approach. Dialogue necessitates being for people in relationship, helping them think for themselves, and is the means to fostering autonomy through a "process of becoming". This is the important ethical attitude that characterizes Socrates' health care relationships and ethical risk communication.

Current principle-based bioethics consists of four principles: respect for autonomy, beneficence, non-maleficence, and justice. The current principle-based concept of respect for autonomy stems from Kant (1724-1804) (see section 2.3). Like Socrates, Kant's principle develops the idea of "think for yourself". I argue that the principle of fostering autonomy (non-paternal healthcare relationships) and the principles of beneficence and non-maleficence stem from Socrates. Thus, except for the modern principle of justice, the principle-based ethical framework can be rooted in Socrates.

The principles of beneficence and non-maleficence (promote good and cause no harm and evil) were shown to be in the Hippocratic ethical tradition (see section 2.3). These principles are held as well by Socrates. In the *Apology*, Socrates argues that he would never intentionally cause harm to any person (Apology, line 26 and line 37) - the basic tenet of the principle of non-maleficence, and he describes himself as a "public benefactor" - trying to promote the good (Apology line 36d). In the *Euthyphro*, Socrates argues that the physician's care is for the good and welfare of the patient, for health and never to injure the person (Euthyphro, line 13c). Socrates says a public benefactor is like a good gardener, starting with the young shoots first and clearing away those who will harm them (see Introduction).

The divergence in the Socratic and our Hippocratic tradition is evident in their relationship with people, specifically the "double process" presented as the basis for the deliberative model (see section 2.6.3). The "double process" stems from Socrates' activity as healthcare provider, based in fostering autonomy presented in the *Charmides* dialogue (see section 4.5). Importantly, an explicit mention of fostering autonomy is absent from the Hippocratic oath, and historically it has been considered an authoritarian healthcare ethic. In contrast to Socrates, the emphasis of Hippocrates of Cos was argued to be "serving the science" rather than the person (see section 2.2). What does Hippocrates mean by "serving the science"? (see section 4.6)

This chapter works toward developing the public health context for the concept of fostering autonomy, which originates in Socrates' activity of helping people "think for themselves", emphasizing the obligation of public health providers to "knock on the door of the public" (Howell 1996). The need for fostering autonomy will be demonstrated through the historical dialogue on chemical contaminants in the environment in the *Canadian Journal of Public Health*. The concept of fostering autonomy based in Socrates will be the focus of Chapter 4.

3.1.2 Public Health Context

Generally, uncertainty in both the science and the ethical principles increases as causal relationships shift from "one to one" in the short term to "many to many" over the long term. As we move from "one to one" causal relationships to more complex situations, the probability associated with risk estimates becomes more obscure and the direct applicability of the ethical principles of beneficence and non-maleficence decreases. It will be shown that the need to adopt a relational ethics approach to health risk communication increases with increasing levels of uncertainty. Relational ethics involves developing a joint ethical narrative.

"One to one" causal relationships are typified by acute toxicological relationships where chemicals can cause immediate ill effects or death when consumed at an appropriate dose. The ethical principles are applicable to situations of risk where the causes and the consequences, or acts and outcomes, are clearly connected. The weight of the principles of beneficence and non-maleficence can be directly mapped to the causes, and the consequences of our actions can be an explicit part of the deliberation to act. Beneficence and non-maleficence require that we do not expose people to acutely toxic chemicals, that we remove these chemicals from people's immediate environment, and that we prevent the release of acutely toxic chemicals to the environment.

In the case of "one to one" relationships there is a need to consider the concept of fostering autonomy as well as beneficence and non-maleficence. Fostering autonomy is crucial for enabling people to understand the risks such that they can avoid harm through their own decisions. Thus, public health providers need to fulfill their obligation of "knocking on the door of the public" and foster autonomy to make sure people share their meaning of the serious risks. In situations of immediate danger, the advisory may even be peremptory.

In more complex causal relationships, "one to many" and "many to one", the causes and the consequences are not clearly connected. The causal factors and the effects are often separated in both time and space. For example, cancer has a complex etiology with many causes and each contributes at different times with different weights. Observable outcomes often manifest several years after exposure to the causes that set the disease in progress. It is not possible to identify and quantify each minute act that may be involved in disease. In general, both the causes and consequences are indeterminate, and the basic ethical principles cannot be simply mapped "one to one" to the causes. Awareness of this ethical uncertainty limits the applicability of consequential approaches to public health ethics and characterizes our present time as a "risk culture" (see section 2.2)

The complexity is compounded as causes are also a function of the environment, or the cultural, social and political climate; the risks are embedded within society and cannot be isolated and independently removed in accordance with the weighting of an ethical principle.

Regardless of whether chemical risk is distributed fairly, or if risk is described as voluntary or involuntary, the people actually facing the risks must consider the particular circumstances and determine how it is possible to mitigate the pressing risks within the given social structure. Thus, fostering autonomy needs to be conceived in a different light in public health from that presented for health care (see section 2.6). Fostering autonomy involves enhancing the agency of people within the given environment or social structure. The ethical principles of beneficence and non-maleficence take practical form largely through the actions of the individuals facing the risks, and only less so through the activities of public health practitioners. Health advisories need to consider this practical dimension so as to attempt to fully inform individuals of decision options. Otherwise they will simply be token symbols of risk managers' awareness of risks.

Public health actions have the potential to change both the environment, or abstract social structures, and thus also the distribution of risks. In this respect, the principle of respect for autonomy takes the form of helping people participate in broad social decisions. A concept of informed consent is required where the voice of the people who actually face the risks is heard to determine what values will be embraced in formulating risk options. This will support the recent calls for public participation involvement in risk management (Bates 1994, see section 1.2 and 1.5). A model of informed consent in health care was developed and provides a starting point (see section 2.5). This concept needs to be developed within a broader concept of the principle of justice. The modern principle of justice refers to the distribution of goods, like health care. Health advisories play a role in developing public awareness of risks, such that the public can participate in this process. A practical process for public health will be developed in Chapter 5.

The main challenge from a relational ethics perspective is to establish a meaningful relationship with the public. Presently, there is no real dialogue between public health providers and the public (see section 1.3). Health Canada believes that simply producing health advisories will be ineffective in fostering autonomy in "many to one" situations (Harrison and Hoberg 1994). In contrast, Viscusi and Zeckhauser (1996) claim that individual consumers "do take precautions in response to hazard warnings, such as wearing rubber gloves and placing poisons in a childproof location" in "one to one" situations (Viscusi and Zeckhauser 1996, p. 113).

However, the first national survey on sun exposure and protection reveals that 47.5% of Canadians rarely or never use sunscreen to counter the sun's ultraviolet rays (Edmonton Journal May 31, 1997), analogous to previous reports in Alberta in 1994 (Campbell and Birdsell 1994). Knowledge of the relationship between skin cancer and the sun's ultraviolet rays dates back to at least 1945. Similar results have been reported with respect to health advisories and air pollution (Steib et al. 1996). Health advisories did not result in protective action, and the most common reason for inaction was the individual's perception of an inability to actually do anything. These data reflect our culture as much as individual choices. We need to describe the cause and effect relationships in such a way that people can know the alternatives. Clearly, we also need to evaluate the effectiveness of health risk communication; at least to some degree, public health risk communication needs to be practiced as a science, meaning a method whereby the outcomes of our directed operations can be observed.

The analysis in this chapter progresses from an introduction of the basic concepts of risk and science in the area of risk assessment (section 3.2), "one to one" causal relationships (section 3.3) and ethical approaches (section 3.4), to "many to many" causal relationships (section 3.5). The risk communication in Canada of complex mixtures will be explored with emphasis on tobacco and nutrition (section 3.6), alcohol (section 3.7) and concludes with "complex" causal relationships where chemical contaminants are within food, in particular chemical contaminants in fish (section 3.8).

3.2 The General State of Risk

Decision Theory has developed to handle questions of risk, the concept having origins in the risk presented by Socrates on the question of life after death (see Introduction). Socrates says just before his execution with hemlock poison in the *Phaedo* dialogue:

> No reasonable man ought to insist the facts are exactly as I have described them - since we have clear evidence that the soul is immortal - this, I think, is both a reasonable contention and a belief worth risking, for the risk is a noble one. (Phaedo, line 114d)

Socrates suggests that we should live our lives in accordance with the possible claim that those who live the "good-life" are rewarded in the afterlife. Socrates' concept of soul meant the ability to perceive and judge good and evil, the ethical question of whether our actions are right and wrong (Cornford 1981). The meaning of soul is closely related to the ideas of psyche or mind and was not considered separate from the body. Socrates explicitly discusses the brain and thinking in the *Phaedo* dialogue (see note 4.2). In the *Republic*, Plato says: "The soul has a work which you couldn't accomplish with anything else in the world, management, rule and *deliberation*" (Republic I, line 353d). The presence of the soul is what would allow someone to rationally consider the ethical principles of beneficence and non-maleficence in their actions, i.e., promote the good, prevent and remove harm and evil. Fostering autonomy for Socrates could then be thought of as fostering the capacity to reason.

Science at the time of Socrates, the Ionian science tradition, was concerned with how the world came to be, looking into the past at the first causes. Both Socrates and Hippocrates were discontented with this aspect of Ionian science (Cornford 1981).[2] However, there was a very practical side to Ionian science (Farrington 1944). In particular, Thales and Anaximander advanced the developments of geography and navigation; the ancient Greeks had risk on their minds.

Socrates shifted the gaze of the eye inward, and towards the uncertain future, towards the study of the reason why things happen and the purposes of human society, to the ends which we ought to pursue. Socrates argues that we should not spend our time pondering the prospects of life and death, but focus on the right and wrong of our actions here and now (Apology line 28b). Socrates asks the ethical question and places the questions of life after death into the *nondeliberative* realm.

Importantly, even though Socrates believes that he has some evidence, he describes the situation as being under risk because he is conscious that he does not possess any real knowledge of what comes after death (Apology, line 29b). Socrates is game for discussion and learning, challenging each person to think for themself. He does not assert static facts. Socrates says that most people dread death as though it were a certain evil. He argues that this is a form of thinking that one is wise when one is not, because nobody knows what happens after death. This is ignorance for Socrates, when one thinks that one knows when one does not (Apology line 29b).

A very complex notion of "probability of occurrence" is invoked in the *Phaedo* dialogue to describe the fate of the soul (Phaedo, line 88). The body (the visible realm) and the soul (the invisible realm) are said to be fastened together through pain and pleasure (Phaedo line 83d). The question being addressed is whether each (body and soul) perishes on its own at death; is each, as Socrates says, scattered by the winds at death disappearing into thin air? Cebes argues that (1) if both soul and body exist independently and are held together in tension (Phaedo line 86c) and (2) if the soul exists before birth and after death, then (3) unless the soul persists through successive incarnations without any ill effects, then at any one death the soul may perish altogether. Cebes' argument involves a very sophisticated idea of probability and ignorance, that "nobody knows which of these deaths or separations from the body may prove fatal to the soul".[3] This is our starting point in the illusive "quest for certainty": the search for an unchanging, invariable reality to ground our hopes and fears, thoughts and decisions (Dewey 1929). Just exactly what the "good-life" is to Socrates is beyond the scope of this essay, but importantly, we see that immortality is a risk, a gamble, not a certainty; from the perspective of the living, life after death must be ascribed a certain precarious probability.

3.2.1 Risk and Contemporary Decision Theory

In contemporary decision theory, there are three general knowledge states of decision: ignorance, uncertainty, and certainty (Resnik 1987). *Decision under ignorance* implies that it makes no sense to assign probabilities to the outcomes emanating from particular acts. This is most easily conceived as the case of a new toxicant where there is no toxicological information. In this case it makes no sense to estimate probabilities. Ignorance may be partial or total, as it may be possible to assign probabilities to some outcomes from some acts, but none for other acts. This may be approached by considering the risk of cancer from one cigarette, or to one chemical within a complex mixture of chemicals, such as the risk from nicotine within the complex mixture of chemicals in tobacco smoke.

Decision under certainty implies that an act will result in a particular outcome. The relationship between the act and the outcome is completely determined. This state may be approached in acute toxicology, where consumption of a large dose of a toxicant, like the shellfish toxin - saxitoxin, or hemlock poison that killed Socrates, will kill virtually every person.

Decision under uncertainty implies that the outcome of a particular act is not completely determined. The outcome may or may not occur, and thus the outcome must be described as a probability. In the case of saxitoxin exposure, this state exists when people are exposed to doses lower than the lethal dose that kills virtually every person.

These three states are an idealization, and decisions may not fall neatly under any particular one. Public health decisions regarding the ability to assign causation to particular chemical exposures fall into all three decision states. The ability to assign a probability to the effect of a particular chemical exposure decreases as the causal relationship moves from "one to one" to "many to many". As the disease or outcome under consideration moves from simple cases of acute toxicology to complex health effects like cancer or neurological effects, the decision state moves from certainty to ignorance.

The leading perspectives on causal inference in science and in epidemiology are Popper's criteria of falsifiability (or conjecture and refutation) and Hill's Criteria of Causal Inference (Table 3.1) (Rothman 1988, Hill 1965). Popper developed his ideas from consideration of the perspectives of Einstein and Socrates (O'Hear 1980).

Popper holds that Socrates' claim to be ignorant provides a prime example of a man imbued with the scientific spirit, willing to reject certainty and any claim to authoritative knowledge. Both Socrates and Einstein share a similar position in that they want their arguments falsified. They are not concerned with consensus or majority opinion. Socrates asks: "Ought we to be guided and intimidated by the opinion of the many or by that of the one - assuming there is someone with expert knowledge?" (Crito, line 46d, p. 32). Socrates engaged in dialogue to learn. He searched for arguments that refute and thus advance the theory being proposed. Similarly, Rothman cites Einstein's reply to the "One Hundred Authors Against Einstein" who claim to refute his theory of relativity: "Were my theory wrong, it would have taken but one person to show it" (Rothman 1988, p. 6). Popper recognized that Einstein's theory of the universe led to making predictions, expectations that could be tested and falsified, and this characteristic made Einstein's theory scientific.

This is reiterated by Plato when discussing a fundamental tenet of Greek thought, that we must consider the part in relation to the whole. Phaedrus says: "If we believe Hippocrates of Cos we cannot even understand the body without such a procedure". Socrates says: "No, and he is right, but we must not just rely on Hippocrates; we must examine the assertion and see whether it accords with the truth" (Phaedrus, line 270c). Heidel (1941) suggests the passage reveals Plato's respect for Hippocrates of Cos, but also demonstrates that Hippocrates follows Socrates' lesson; do not to be content with arguments because they are spoken by an authority, but rather test the arguments. Is this what Hippocrates means when he says: "serve the science"? (see section 2.3)

However, the passage also reveals what Dewey (1929) argues is the distinction between ancient Greek and modern conceptions of truth, i.e., "accords with the truth". Dewey claims the historic conception of truth is correspondence with an antecedent reality or essential being and "the theory of knowing is modelled after what is to take place in the act of vision" (Dewey 1929, p. 23) cf. (Bohm 1983). There is then a complete correspondence between knowledge in its true meaning and what is real. Dewey argues that the modern scientific perspective is a shift to the consequences of our directed actions, to predictions: "The important conclusions of science are those which distinctly refuse to be identified with anything previously known. Instead of having to be proved by being assimilated to the latter, they rather occasion revision of what people thought they previously knew" (Dewey 1929, p. 184). According to Dewey: "Progress in science depends upon choice of operations performed and not upon properties of objects which were alleged to be so antecedently certain and fixed that all detailed phenomena might be reduced to them" (Dewey 1929, p. 186). Arguably, Socrates thought something similar to Dewey (see note 3.3 and section 4.4).

With respect to the role of chemicals in human disease, scientific experiments provide equivocal evidence which cannot clearly indicate that a chemical "causes" disease. To approach the question of causation, the basic concepts that have developed in twentieth-century science will be simplistically presented with their relationship to risk assessment. In particular, the developments of physics will be discussed as they represent a fundamental paradigm shift in the theory of causal relationships (Dewey 1929, Bursztajn et al. 1980). They suggest that the lessons of twentieth-century physics developed the mechanistic science of certainty into a science of probability and uncertainty.[4]

Risk assessment generally consists of hazard identification, dose-response assessment, exposure assessment and risk characterization (E.P.A. 1997). Risk is defined as the probability that a substance or situation will produce harm under specified conditions and time frame (E.P.A. 1997, V.1-p. 1, V.2-p. 3). *Hazard identification* describes the chemicals involved (sources, identities etc), the types of biological effects or events that can occur (experimental and epidemiological evidence). *Dose-response assessment* evaluates the mathematical relationships between chemical exposure and the incidence of adverse effects. *Exposure assessment* determines the conditions under which people could be or are exposed to chemicals.

Risk characterization is the actual process of determining a particular risk. Recently, an analytic-deliberative process has been presented where the aim of risk characterization is "to describe a potentially hazardous situation in as accurate, thorough, and decision-relevant a manner as possible, addressing significant concerns of the interested and affected parties, and to make this information understandable and accessible to public officials and to the parties" (National Research Council 1996, p. 2).

3.2.2 Theory and Hypotheses

In both science and ethics, what is important is that theory provides our perspective, which is to say the ability to see and reflect on risk or the world more generally (Bohm 1983, Slovic 1993). Heisenberg (1971, 1989) says he once believed, and thought Einstein did as well, that science is empirical, and that we draw our concepts and our mathematical constructs from the empirical data. But Heisenberg continues, when he asked Einstein about this, he said: "It may have once been my philosophy but it is nonsense all the same. It is never possible to introduce only observable quantities in a theory. It is theory which decides what can be observed" (Heisenberg 1989, p. 10).

Theories are ways of looking at the world, insights, and not a form of knowledge of how the world really is (Bohm 1983). The word 'theory' derives from the Greek word *theoria*, which has the same root as theatre; in short meaning to view, or to make a spectacle. The concept of theory for Socrates is developed in the *Phaedo* dialogue. Socrates argues first that observation by the eyes, ears and other senses is entirely deceptive (Phaedo line 83). Therefore the soul must use reason and what the soul sees with reason is entirely intelligible but invisible. This can be grasped by thinking about the theory of gravity. Socrates describes the metaphor for the origination of his concept of theory in the *Phaedo*:

> It occurred to me that I must guard against the same sort of risk which people run when they watch and study an eclipse of the sun; they really do sometimes injure their eyes, unless they study its reflection in water or some other medium. I conceived of something like this happening to myself, and I was afraid that by observing objects with my eyes and trying to comprehend them with each of my other senses I might blind my soul altogether. So I decided that I must have recourse to theories, and use them in trying to discover the truth about things. (Phaedo, line 100)

The scientific spirit of Socrates' investigation into the nature of things with theory is also clearly elaborated. Simmias says to Socrates: "It is very difficult if not impossible in this life to achieve certainty about questions, but at the same time it is utterly feeble not to use every effort in testing the available theories, and to select the most dependable theory which human intelligence can supply and use it as a raft to ride the seas of life" (Phaedo, line 85d). Socrates replies: "Your feeling is very likely right, my dear boy, but tell me where you think the flaws are" (Phaedo, line 85e).

In contrast, an hypothesis is a supposition, an idea that is put out by our reasoning (Bohm 1957). Hypotheses are tested to be true or false. Similar to Socrates, it is Popper's contention that science progresses by falsification (Rothman 1988). Hypotheses test particular aspects of theories and allow them to grow. Recently it has been argued that scientific evidence does not unequivocally rule out particular hypotheses (or theories), because the data underdetermine most hypotheses (Bursztajn et al. 1990[4], McMullin 1995, Weed 1997). In this respect, "the facts do not speak for themselves" and the role of judgement in accepting or rejecting particular hypotheses plays a large role. This is particularly important with respect to chemicals where they do not uniquely contribute to health effects, i.e., many to many causal relationships.

Theories are readily accepted and provide results. In physics and chemistry, Democritus' (460-370 B.C.) theory of atomism has provided insight into the mechanical view of nature for 2,500 years (as well as the recent idea of the molecule) (Bohm and Hiley 1993). Einstein quotes Democritus as saying: "In reality there are atoms and the void. That is, the objects of sense are supposed to be real and it is customary to regard them as such, but in truth they are not. Only the atoms and the void are real" (Einstein and Infeld 1947, p. 56). Democritus' theory develops from having the "eye" focused on the stars.[5] The stars appear to exist primarily as separate, parts separated by empty space, the void, and the separate parts, the atoms, are brought together to form the whole, an organism. Apparently, Democratus' idea came from looking at dust in the sunlight (Kahn

1960). Democritus' idea of the atom was an indivisible hard body. This idea works rather well, even though we do not know what physically lies beneath the abstract structure of the molecule (or subatomic particles). We talk unassumingly about molecules or chemical contaminants as "things in the world". Bohm accounts for the existence of "things" with his principle of relative autonomy of sub-totalities[6] (Bohm 1983). The ideas and the language associated with the theory of the molecule have attained a relative stability or authenticity, analogous to the stability of the properties associated with molecules at the macro-level.

Democritus' fundamental idea suggests that the world can be reduced to the forces of finite things, the atoms, and provides the basis for the mechanical view of the world. Twentieth-century physics challenges this notion that reality can be reduced to some simple mechanical forces of atoms (Einstein and Infeld 1947). Bohm suggests the perspective has shifted to another ancient Ionian Greek, Heraclitus (500 B.C.) (Bohm and Hiley 1993) (see note 3.9). Heraclitus claimed that everything is in continual change or eternal flux (Copleston 1962, see Jones 1923 vol. 4 for Heraclitus' writings). This general characteristic of the world has never been contradicted in any observation or scientific experiment (Bohm 1957).

Likewise, abstract theories of biological processes underlie risk assessment. Theories of biological processes are relatively unstable in comparison to that of the molecule. Living things cannot be readily reduced to mechanical terms, atoms, in particular the structure of protein or DNA. The interactions between different "things" in organisms constitute a single structure of indivisible links.

Stovall (1947) discusses the importance in the change of perspective of the body as composed of individual functioning units in understanding the nature of cancer and development - cells, sacs of water, or for eukaryotes - a cell within a cell. However, the discovery of the virus, DNA and RNA vectors, provides impetus to challenge our common conceptions of life. Stovall (1947) and Potter (1945) present the dominant theory that cancer begins within one particular cell. When one cell grows independently from the rest of the cells, the body or tissue, it goes off on its own and becomes cancerous.[7] This point was reinforced by Grace (1950), where he emphasized the importance in recognizing that cancer begins at the cellular level, well before being visible at the clinical level.

In science, the development of the theory of cancer over 50 years can be seen from two perspectives, that of Potter (1945) and that of Fardon (1953). Potter says the imperceptible changes in the cell can be divided into three steps:

> I. the induction period: result of radiation, chemical carcinogens, heredity, viruses
>
> II. the critical period: affected by irritation, injury, caloric intake, exercise
>
> III. the period of progression: result of release from the constraints of normal cells

The theory of cancer causation focuses on environmental factors, and caloric intake in the diet. Potter emphasizes that these factors are preventable and suggests that we should reflect on the changes in environmental factors that we can see with our own eyes: "As a concrete illustration between 1910 and 1920 this country changed from the horse and buggy stage to the automotive era" (Potter 1945, p. 105). He also says that when "animals are placed under conditions analogous to those of 'civilized' man, the incidence of cancer increases."

Fardon (1953) presents the theory that cancer causation involves genetic mutations, leading to these basic tenets:

> I. A "point" or regional mutation affecting one or more genes, which directly or indirectly is responsible for the initiation and continuation of an indeterminate number of cell divisions.
>
> II. This type of specific mutation need not necessarily involve a chromosomal aberration or any kind of visible nuclear change.
>
> III. Cells so mutated may or may not show incomplete differentiation.

> IV. Other mutant characteristics may be associated with the cell-division factor, the frequency of such occurrence being dependent upon the relative mutagenic susceptibility of other genes (Fardon 1953, p. 442).

Against these perspectives, we can see that the theory of cancer has developed. Mutations to genes can result from an error in DNA replication and both endogenous (primarily free radicals) and exogenous chemicals binding to the DNA (Keyer and Imlay 1996, Ashby and Paton 1993). The provocative theory of directed mutation also includes DNA mutations (Cairns et al. 1988, Strauss 1992, Christians et al. 1995, Lenski and Sniegowski 1997).

Knowledge of regulation of the cell and cell cycle has grown tremendously and now includes theories involving an imbalance of gene expression, oncogenes and tumour suppressor genes in response to causal factors (Sherr 1996). In cancer, two basic processes are important, cell proliferation and inhibition of apoptosis, active cell death. The process of apoptosis, active cell death, has attracted attention only within the last 10 years. Apoptosis is now viewed as a fundamental biological process, along with cell proliferation and differentiation, where chemicals are associated with cancer and developmental effects (Marsman and Barrett 1994, Haanen and Vermes 1996).

The theory of the biological being is continually developing, and within this changing perspective the health risks have to be tentatively ascribed. With respect to risk assessment, the hazard identification and dose-response elements provide theory which enables us to observe and reflect on chemical exposure assessment. The hazard identification provides the physical concepts of risk, and dose-response assessment the mathematical formulation.[8]

3.2.3 Chemicals in the Environment

In general, people are exposed to a complex mixture of chemicals in daily life in air, food, beverages, water, cosmetics, pesticides, herbicides, paints, stains, glues, soldering, and not to only one chemical. Chemicals cause a substantial amount of harm: in the U.S.A., cigarette smoking is responsible for 400,000 deaths per year, alcohol for 100,000 deaths per year, occupational and environmental chemical exposure for 60,000 deaths per year, and 60,000 deaths per year from particulate air pollution (E.P.A. 1997, vol 2, p. 4). However, the benefits of chemicals are clear through the positive effect of fruits and vegetables (see section 3.6.2 below), the demand for products and services related to chemicals, like drugs, and we should not forget that chemical energy in the form of food sustains life.

There are approximately 65,000 to 70,000 "man-made" chemicals in use (Magos 1988). Over 17,000 chemicals have been identified in food, drugs, pesticides and cosmetics and for 44% of these there is no toxicity information. Considering commercial chemicals overall, for 80% of these there is no toxicity information (Magos 1988). Cote et al. (1995) suggest that for the majority of chemicals in air pollution, there is inadequate scientific information to support sophisticated quantitative analysis of health risks. Only 143 of 325 air pollutants, where ambient concentrations have been measured, have some health data. The current state of knowledge supports only qualitative risk assessment.

With respect to neurotoxic effects, fewer than 10% of chemicals have been evaluated for neurotoxicity (Landrigan et al. 1994). Landrigan et al. (1994) suggest that it is not possible to develop quantitative risk assessment at this time because the fundamental mechanisms of action are not known. Of 3,301 chemicals tested for teratogenecity, 37% are teratogenic, yet approximately 65% of birth defects have an unknown or polygenic cause (Schardein 1993). On an individual chemical basis, 55 of 104 chemicals tested in the National Toxicology Program are classified as causing cancer, 42 are classified as not causing cancer, and for 11 chemicals the evidence is equivocal (Huff et al. 1991, Huff 1993, Ashby et al. 1997). Ashby and Paton (1993) present a detailed analysis of the structure-activity relationships for the 55 chemicals to support qualitative prediction of genotoxic carcinogens.

Carcinogens are generally classified as genotoxic, or nongenotoxic, and as tumour promoters or initiators, depending on the particular experimental mode of examination. Non-genotoxic mechanisms are involved in the carcinogenic process through mechanisms not involving DNA mutation. Tumour promoters refer to the ability to promote tumours in the two-stage or multi-stage carcinogenic experiment, after other factors have initiated them.

The state of knowledge suggests that the qualitative aspects of chemical risk needs to be emphasized. Emphasis in risk assessment to this point has primarily been on a single chemical exposure from one environmental medium, like air, in attempts to give a quantitative calculus of risk. This is implicit in the definition of risk as the probability of harm. The E.P.A. (1997) risk assessments approach suggests that the focus needs to shift to analysis of complex mixtures that more accurately represents the reality of environmental exposures. All the chemicals exist in differing amounts, some minutely, others in significant concentrations. We are all exposed to a unique complex mixture. Each of us may be uniquely susceptible to these exposures, reacting in different ways to the same exposure at equal concentrations over equivalent time frames.

Most disease has a complex etiology and is a result of different factors (e.g., exogenous and endogenous chemicals, genetic factors, biological agents, and nutrition) acting in concert over varying time frames. There are large data gaps in the etiology of most disease, the underlying biology, and the role of complex chemical exposure patterns. The scientific evidence in many cases is not sufficiently developed to permit a determination of effects. Estimation of risks has even been shown to vary depending on who examines the same scientific data (Bates 1994). For example, Health and Welfare Canada derived an acceptable level of exposure to dioxin which is 1,700 times greater than the U.S. Environmental Protection Agency with the same scientific data (Harrison and Hoberg 1994). We thus are in a state of decision under ignorance; ignorance which is complete in some instances and partial in others. The risks from chemical exposures need to be described in both their qualitative and quantitative aspects to facilitate a meaningful comparison of different chemical risks.

It is unrealistic to expect any one person to assimilate and fully comprehend the extensive amount of information on all chemicals. However, public health practitioners and risk communicators owe the public an awareness of what is known. As a result of this limited and uncertain ability to comprehend and communicate information about the huge number of chemicals in the environment, a form of weak parentalism or paternalism exists. The public depends on "public health" first to bring particular chemicals to their attention and then, like Socrates, admit to the limitations of that knowledge.

Socrates provides a vision of a way to approach risk, considering the contributions of both specialized knowledge and ignorance:

> Each action will be done according to the arts or sciences, and no one professing to be a pilot when he is not, no physician or general or anyone else pretending to know matters of which he is ignorant, will deceive or elude us. Our health will be improved; our safety at sea, and also in battle, will be assured; our coats and shoes, and all implements will be skillfully made, because the workmen will be good and true.
>
> Aye, and if you please, you may suppose that prophecy will be real knowledge of the future, and will be under the control of wisdom, who will deter deceivers and set up true prophets in their place as the revealers of the future. Now I quite agree that mankind, thus provided, would live and act according to knowledge, for wisdom would watch and prevent ignorance from intruding on us in our work.
>
> But whether by acting according to knowledge we shall act well and be happy my dear Critias - this point we have not yet been able to determine. (Charmides, line 173)

In Socrates' vision, people admit their ignorance and this prevents it from intruding on practice. However, Socrates never found the science and knowledge of past, present and future. The *Hippocratic corpus* offers a critique of risk management, along the lines of Simmias' metaphor of theory (see section 3.2.2), and some guidance which we can apply to approach Socrates' vision:

> One's task, therefore, is to become so well informed as not to make more than small mistakes in one or other direction. Personally I would

> commend extremely highly the physician who makes *only small mistakes*, for perfect accuracy is seldom seen. Indeed, most physicians appear to me to be in the same plight as bad pilots; these, when they are steering a ship in a calm sea and make a mistake, are not detected; but, when overtaken by a storm or violent tempest, it becomes obvious to everyone that, through their incompetence and ignorance, they are bringing the ship to destruction. (Brock 1929, Ancient Medicine, p. 42)

Through becoming informed, as public health risk managers and individuals, we can minimize the direction of our mistakes and increase competence in handling the risks and daily gambles. Information on chemicals will flow to particular individuals, risk communicators and the public, in the transmission of science culture, and the knowledge that results will be subjective, unverifiable and unstable (Gadamer 1996). Further, from the information that people receive in the flow, what they take in as new knowledge will be based on their personal understanding of biological organisms and knowledge of chemicals, or their theoretical perspective in general. There is great potential for *incommensurable* views within the science community and the public more generally (Biagioloi 1990, Veatch and Stempsey 1995, Weed 1997). This may contribute to deep misunderstandings of chemical risks and the ethics of risk between individuals. In some respect, the problem of *incommensurability* leads to reliance on expert opinion, and to the advocation of a consensus approach, or as Rothman (1988) says, a "mob psychology" approach to decision-making. For decision-making under ignorance, a process that explicitly reveals the points of consensus and divergence needs to be developed (see Chapter 5).

Health risk communication must provide people with the ability to take in the information, create knowledge, and develop commensurable views. Risk communication involves helping the public develop a perspective from which to filter the flow of information from the media, and risk communicators, at the risk of developing fallacious ideas. This means an understanding of both the statistical and physical dimensions of risk. At the very least, the public should be aware of the basic concepts that are important to approach understanding the realms of information about chemicals: (i) toxicity: acute and chronic (ii) time of exposure: acute and chronic (iii) dose-response relationships (iv) threshold (v) causality and contingency (vi) probability and perhaps (vii) persistence in the environment: degradation, bio-accumulation, bio-concentration. Health risk communication must serve to develop a shared theoretical perspective between the public and risk managers. Fostering autonomy is developing a person's "spectacles" to observe risks within the world; perceptions and attitudes must be developed so that people can deliberate about the risks and after Socrates, "think for themselves". This process should start in grade school.

3.3 Socrates' Existential Knowing: Science and Ethics

3.3.1 "One to one" Causal Relationships

"One to one" causal relationships mean that one act can be mapped to one specific outcome (Bohm 1957). The "one to one" causal relationship approaches decision under certainty or uncertainty. Consumption of a significant dose of an acute toxin, like saxitoxin, will kill virtually everyone within minutes (Schantz 1986). Similarly, Socrates was executed with a dose of hemlock poison that would kill virtually anyone. Socrates' death provides us with scientific experience, knowing through directed operations, the effect of an acute dose or exposure to a chemical toxicant:

> Socrates quite calmly and with no sign of distaste drained the cup in one breadth. Socrates walked about, and presently, saying that his legs were heavy, laid down on his back.
>
> The man who administered the poison - kept his hand upon Socrates, and after a little while examined his feet and legs, then pinched his foot hard and asked if he felt it. Socrates said no. Then he did the same to his legs, and moving gradually upward in this way let us see that he was getting cold and numb. Presently, he felt him again and said that when it reached the heart, Socrates would be gone.
>
> The coldness was spreading about as far as his waist when Socrates uncovered his face, and said his last words - Crito, we ought to offer a cock to Asclepius. See to it, don't forget.

> No, it shall be done, said Crito. Are you sure that there is nothing else?
>
> Socrates made no reply to this question, but after a little while he stirred, and when the man uncovered him, his eyes were fixed. When Crito saw this, he closed his mouth and eyes. (Phaedo, line 117d)

Socrates died within a few minutes after the chemical toxicant was administered, a "one to one" causal relation. Most chemical exposures in the environment are at concentrations well below the lethal dose.

The characteristic that suggests a causal relationship is the existence of a regular relationship between a particular act and outcome which holds in a wide range of environmental conditions with predictable reproducibility (Bohm 1957). Socrates' death from hemlock poison would have held in a variety of contexts. These data then support the "hypothesis" of causality or refute the counter-balanced null hypothesis that deaths in people that consumed a dose of saxitoxin or hemlock poison is coincidental or arbitrary.

All causal relationships are defined in a specific context or environment and are subject to contingency, or chance. Contingencies represent independent factors which exist outside the context in which the causal law has been specified. Random fluctuations in these entities lead to chance and the theory of probability.

Contingency and causality represent opposite views of the same object; they represent mutual limitations (Bohm 1957). In an actuarial account of risk, (i.e., insurance statistics), the assumption is that the causes of death for specific individuals operate independently, leading to general statistical laws of chance, based on age, gender and so forth. There is no need to take account of the details of the individual cases. For example, a predictable number of people die each year in automobile accidents based on age irrespective of the particulars of each accident. In the case of epidemics, the interconnection of the cause of death for different individuals grows so strong that the statistical predictions based purely on chance do not account for the deaths. There comes a point when the deaths must be viewed from the causal side in order to make accurate predictions.

In the case of the acute lethality of saxitoxin or hemlock poison, the contingencies are relatively unimportant, and thus the role of chance is negligible. A contingency in this context may be another chemical in the environment, one that interferes with the action of the chemical, saxitoxin or hemlock, with the result that a person so exposed does not die when it was assumed they would. Alternatively, a more difficult situation is a factor that is present unknowingly that also contributes to the effect. More generally, an organism's active repair of its body is a contingency that becomes unimportant in the case of acute toxic poisoning. The placebo effect is a second such contingency in human beings, and as randomized control trials demonstrate, this contingency is often very important in sublethal exposure to chemical drugs (Elander and Hermeren 1995). We emphasize these last two contingencies, organism repair and the placebo effect, to mitigate the risk of an overly reductive and static conception of living organisms (Hewa and Hetherington 1995, Moyers 1993).

3.3.2 Toxicological Concepts

"One to one" causal relationships have been described in great detail for a number of chemicals, for a number of different endpoints such as death or cancer, and generally are represented as dose-response relationships. Socrates develops the concept of dose-response relation, variability and uncertainty, and the "*metaphor of the plant*" through experience with alcohol. Further, Socrates gives us the seed concept of the "environmental" component of public health practice (see note 3.1), saying:

> Drinking gets my approval, in so far as it's a fact that wine refreshes the heart, and both allies worry like a sedative and feeds the flame of good cheer like oil. But it seems to me that the human body is affected in just the same way as plants are.
>
> When God gives plants too much to drink at a time, they can't stand up or breathe in fresh air; but when they drink only as much is

> pleasant, they grow up quite straight and flourish and reach the fruiting age.
>
> In the same way, if we imbibe all the drink at once, both our bodies and our minds will quickly let us down, and we shan't be able to breathe, much less speak. But if servants drop for us frequent dew in goblets small, to put it as Gorgias would have, then, instead of being forced into intoxication by the wine, we shall reach a more playful mood through gentle persuasion (Xenophan 1990, The Dinner-Party 2, p. 235).

The metaphor provides a basis for the understanding of experiential knowledge; the observations of the growth of organisms in different environmental contexts is analogous to the growth of scientific knowledge gained through different experiments. Bohm (1980, 1993) develops this metaphor to describe the concept of "potentiality" and the substantive meaning of scientific knowledge in experiments.[9]

As Socrates suggests, a particular plant grows and develops depending on the environmental conditions. In the case of scientific experiments, the conditions of the experiment (the environment) are controlled and manipulated in order to develop an understanding of the contribution of different environmental factors to the overall growth of experimental results. Likewise, in epidemiology the health of human beings is studied in relation to the environmental conditions within which we live. The tension in the complex relationship between the organism and the environment describes the "potential" growth for any particular organism. The potential growth of human beings is also dependent on the social environment.

Health is not determined purely by the environmental conditions; the nature of the particular plant or organism contributes. As Aristotle (1941) suggests, a particular plant seed, like that of a rose, cannot develop into an orchid.[9] This observation of different seeds distinguishes the concepts of *uncertainty* and *variability*. *Variability* represents the difference in growth of seeds of the same kind, two roses or of 1,000 humans, under the same environmental conditions. Socrates provides insight into variability within populations analogous to the central limit theorem saying: "As you might say of the very large and the very small – that nothing is more uncommon than a very large or a very small man; and this applies generally to all extremes, whether of great and small, or swift and slow, or black and white: and whether the instances you select be men or dogs, or anything else, few are the extremes, but many are in the mean between them" (Phaedo line 89). *Uncertainty* represents the difference between kinds of seeds, a rose and a human seed, under the same environmental conditions. These distinctions are made by Protagoras, as he says to Socrates:

> Consider foods, drinks, and drugs, which some are harmful to men, and others which are beneficial. Others again, so far as man is concerned are neither, but are harmful to or beneficial to horses, and others only to cattle or dogs. Some have no effect on animals but only on trees, and some again are good for the roots of trees but injurious to the young growths.
>
> Or take olive oil, it is very bad for plants and most inimical to the hair of all animals except man, whereas men find it of service both to hair and the rest of the body. So diverse and multiform is goodness that even with us the same thing is good when applied externally but deadly when taken internally. (Protagoras, 334b)

The existence of a *dose-response relationship* increases the confidence that a toxicant and an effect observed are causally related (Figure 3.1). In Socrates' example, as the dose of the toxicant alcohol in the environment increases, the human being is more severely adversely affected, both mentally and physically. Socrates contrasts the effect from consuming alcohol at two doses of alcohol: (1) forced into intoxication by the wine with large doses, and (2) gentle persuasion at small doses. Notice that Socrates is concerned with the rate of change of the effect as a function of the cumulative dose. This is a more complicated dose-response relation than depicted in Figure 3.1.

The *dose-response relationship* does not rule out the idea that there are other causes for the effect which are operating, either actually causing the effect or in conjunction with the causal factor under consideration. We are ignorant with respect to these other causes, hence Peirce's (1878) claim that "no number can be great enough to express the relation between the amount of what rests unknown to the amount of the known" (Peirce 1991, p. 178). In general, this means that theory is indeterminate. There is no test that indicates that all of the causal factors have been identified, that there are no other causal factors that can produce the same effect, or that we are examining all of the effects.

The contingencies of the causal relationship become less important as the dosage increases, i.e., as we approach "one to one" relationships. The percentage of humans or animals that respond in the same way increases with dose, and thus the contingencies in the relationship between the toxicant and the organism decrease as we approach the "one to one" relationship. In Socrates' example, at some large dose of alcohol everybody becomes affected and the contingencies become relatively unimportant.

A second important concept is the *slope of the dose-response relationship* (Figure 3.2). Toxicants with steeper dose-response curves are more hazardous because the difference between a "safe dose" and a "detrimental dose" is relatively small. Notice that Socrates suggests to drink alcohol at a dose where a person feels the effects through "gentle persuasion", i.e., Socrates advocates a shallow dose-response curve.

The *slope of the dose-response curve* is also an indication of the response variability within the human population. Hippocrates discusses the concept of *variability* within the population with a risk comparison of the sensitivity to alcohol and cheese:

> There are many other harmful items of food and drink which affect the body in different ways. For example, the taking of large quantities of undiluted wine has a certain effect upon the body and it is recognized, by those who understand, that the wine is the cause and we know which organs are particularly affected.
>
> Cheese, since that is the example I used, is not equally harmful to all. Some can eat their fill of it without any unpleasant consequences and those whom it suits are wonderfully strengthened by it. On the other hand, there are some who have difficulty digesting it.
>
> There must, then, be a difference in their constitutions and the difference lies in the fact that, in the latter case, they have something in the body which is inimical to cheese and this is aroused and disturbed by it. Those who have most of this humour and in whom it is at its strongest, naturally suffer most.

> If cheese were bad for the human constitution in general, it would affect everyone. (Chadwick and Mann 1950, Tradition in Medicine, p. 25)

Note that contingencies enter the relationship and are responsible for the differences observed. Socrates had the contingent factors with respect to alcohol consumption; Socrates was also notorious for his tolerance to alcohol. Eryximachus says: "We could never keep up with heavy drinking like the rest of you. I say nothing of Socrates, for we know he's equal to any occasion, drunk or sober" (Symposium line 176c). In the end of Plato's *Symposium*, only two people out of ~10 are left standing (20%), Socrates and Aristodemus "of course". As Socrates suggests above, there are few at the extremes.

Toxicants with "steep" dose-response curves suggest that there is little *variability* in response in the population, i.e., all of the population is equally sensitive to the dose. In these cases, there is not much difference between the most and least sensitive members of the population. In contrast, for toxicants with very "flat" dose-response curves, there is a great *variability* in sensitivity to the toxicant within the population. Toxicants with very "flat" dose-response curves present a different ethical challenge because in order to protect the most sensitive persons in a population it will require substantial overprotection of the average and least sensitive persons in the population.

A third important concept in toxicological relationships is called the *threshold dose*. The threshold concept is generally held to have developed from Paracelsus' (1493-1541) principle of toxicology that "all substances are poisons; there is none that is not a poison. The right dose differentiates a poison and a remedy" (Klaassen et al. 1986, p. 3). What this maxim conveys is that all chemicals are capable of being involved in "one to one" causal relationships if they are present in sufficient quantity (or absent in the case of essential chemical nutrients for life, like vitamins). However, this knowledge of thresholds is much older than Paracelsus. As Socrates was being killed with hemlock poison (see above) Crito says:

> That man who is to give you the poison has been asking me for a long time to tell you to talk as little as possible. He says that talking

> makes you heated, and that you ought not to do anything to affect the action of the poison. Otherwise it is sometimes necessary to take a second dose, or even a third.
>
> That is his affair, said Socrates. Let him make his own preparations for administering it twice or three times if necessary.
>
> I was pretty sure you would say that, said Crito. (Phaedo, line 63d)

In situations of acute toxicants that cause death, the threshold dose is the dividing line or border between life and death; for example, above the threshold dose of saxitoxin or hemlock poison, the most sensitive individual will die, and below the threshold dose, no individual will di.e. The threshold dose is only an approximate value; as in the above example it is contingent on the context. Also the value differs from individual to individual and for these reasons the threshold value is indeterminate. The man giving Socrates the poison is concerned about the contingencies introduced by Socrates' activity - the contingencies result in variations in the expected causal relationship.

The threshold dose describes the dose at which the particular effects begin to take place, the point in which a causal relationship between the dose and the effect begin (Figure 3.2). The threshold dose could also be called the lowest observed adverse effect level (LOAEL). The LOAEL is the lowest dose at which effects are observable in experiments. A related term is called the no observed adverse effect level (NOAEL). The NOAEL is the highest dose where no adverse effects are observed in experiments.

In animal experiments, the uncertainty in the threshold dose, meaning the error in the estimate, is directly related to the number of animals in the experiment and the dose regime; the greater the number of animals, the variety of contexts and doses in the approximate area of the threshold dose, the more refined the threshold dose may be described. In this way we can approach the probability of error, in contrast to probability of occurrence.

The threshold dose has been an important concept in risk assessment for determining "safe" levels of exposure. Generally, to determine a "safe dose" (or what is now sometimes called the minimum risk level, acceptable daily intake, or reference dose), the threshold dose is divided by safety or uncertainty factors to account for *variability* and *uncertainty* (E.P.A. Presidential Commission 1997). For example, a safety factor of 10 is used to account for the *variability* within the human population (plants of a kind), and a safety factor of 10 to account for the *uncertainty* in extrapolation from animals to humans (plants of different kinds) if the safe dose is calculated from animal experiments.

Once a toxicant has reached its threshold dose, a toxicant with a "steep" dose-response curve will require less additional dose to cause adverse effects than a toxicant with a flatter dose-response line. However, if we consider lowering the exposure, it requires removal of less toxicant to reach the "safe dose" for a toxicant with a "steep" dose-response curve. In contrast, for a toxicant with a "flat" dose-response curve, decreasing exposure, sometimes even by a large amount, does not substantially decrease the potential for causing adverse effects.

From these concepts, the *threshold dose* and the *slope of the dose-response curve*, the potency of different toxicants can be ascribed. The potency is an expression of both the threshold and the slope. First, toxicants can be classified according to the *threshold dose*; the lower the threshold dose the more potent the particular toxicant. In the case where two toxicants have the same threshold dose, the toxicant with the "steepest" dose-response curve will be the more potent (Figure 3.2).

Calculations of risk for genotoxic carcinogens, those binding to DNA forming mutations, sometimes use the term *potency factor*, referring to the low dose slope. By convention, genotoxic carcinogens have a common zero threshold. The risk from a genotoxic carcinogen is expressed as the particular dose of toxicant multiplied by the slope factor (i.e., Risk = dose x slope). The cancer slope factor of chemicals, called $q1^*$, is used to express the risk of cancer at specific doses: risk = $q1^*$ x dose (E.P.A. Presidential Commission 1997). In this situation, the exposure dose is multiplied by the slope factor to estimate the risk.

3.4 Ethical Approaches to Risk Communication

3.4.1 The Consequentialist Approach to Health Risk Communication

In general, the ethical principles of beneficence (promote the good, prevent evil or harm, remove evil or harm) and non-maleficence (to not inflict evil or harm) can be weighed in relation to the potency (threshold and steepness of the dose-response relationship) and the confidence in the dose-response relationship, or possibly a combination of these characteristics depending on the availability of data. The complete list of criteria for causal inference developed by Hill (Table 3.1) can be used for a thorough ranking of chemicals if there is indeed sufficient information.

The most hazardous chemicals are those with the lowest threshold dose and the steepest dose-response curve for the particular end-point. Based on these properties of chemicals, the ethical principles can be mapped. Along these lines, the weight of the principles of beneficence and non-maleficence increases as the potency increases.

Using a consequentialist approach, exposures exceeding the "safe dose" provide the impetus for health risk communication. If the population is exposed to a toxicant that reaches a concentration above or approaching the calculated safe dose - the threshold dose divided by safety factors - then this provides the impetus to inform the public. The amount of food that can be safely consumed can be calculated by comparing the minimum risk values with the amount of toxicant consumed from eating a quantity of contaminated food. For example, shellfish must contain less than 80 µg of saxitoxin per 100 grams of edible shellfish meats in order to be considered safe for consumption and this is well below the amount estimated to cause poisoning, based on estimates from accidental poisonings (Schantz 1986).

Health advisories may be issued, stating how much food can be safely consumed, by comparing the exposure values with the calculated minimum risk level. Similarly, with respect to cancer, if the risk value obtained from the calculation ($R = q1^* \times$ dose) is greater than the standard, this provides an impetus to inform the public.

However, the fundamental problem for public health is the awareness that our actions cannot be explicitly characterized as safe or dangerous (see section 2.2). This is a serious problem for consequential approaches with respect to both science and ethics; we cannot fully anticipate the consequences of our actions, and the unanticipated consequences cannot be part of the explicit calculation that precedes the act (Bauman 1993). This was anticipated by Dewey (1929). Indeed, the pressing environmental problems illustrate the limitation of consequential and sliding risk-scale approaches for public health (see section 2.5.1). The consequential approach developed by Morgan and Lave (1990) does not address this fundamental problem. As argued in section 2.2, we need to consider the principle of fostering autonomy.

3.4.2 Consideration of Socrates' Principle of Fostering Autonomy

Generally, the ethical principles function well with respect to acute causal relationships where the immediate causal factor can be known. The principles of beneficence and non-maleficence may be clearly deliberated. For the most part we know the harms we are facing, and the probabilities of harm based on group data can be applied to individuals without too much uncertainty.

Ashford (1988) suggests that the impetus to inform the public and the weight of the ethical principles can be related to the certainty in the causal relationship.[10] When we are very certain of causation, then we can apply the principles of beneficence and non-maleficence without much difficulty as (Ashford hopes) "the facts will speak for themselves" (Ashford 1988, p. 379). Risk assessment will be clear and can be separated from the risk management options. As the uncertainty of risk increases - not necessarily the consequences of the risk - Ashford suggests that what is required is a process to decide both the risk assessment and the risk management decisions. This introduces two aspects of fostering autonomy: (1) with respect to specific health choices, and (2) with respect to participation in decision-making (see section 1.2).

The first conception deals more specifically with health advisories. In "one to one" causal relations, the principles of beneficence and non-maleficence may outweigh fostering autonomy, i.e., strong parentalism or paternalism, in that public health providers have an obligation to make sure that people are not exposed to serious harms. Morgan and Lave (1990) argue that in cases of acutely toxic exposures, like a chemical spill from a truck accident, or lethal levels of toxins in shellfish, or more generally cases where an immediate causal factor produces an adverse effect, we have a responsibility to prevent people from entering harm's way, that neutral risk communication is not appropriate; we have a duty to override personal autonomy. They assert the use of strong paternalism, coercion and manipulation, to protect people by providing barricades from the truck and removing shellfish products from the economy. Indeed, people may feel wronged if their autonomy were not partially subsumed to the extent that they should be guarded from straying into harm's way unknowingly through not understanding or missing the barricade.

With respect to fish health advisories, for cases like saxitoxin, Ahmend et al. (1993) point out a distinction between regulation of commercial and sport fish. Strong paternalism can be applied only to commercial regulation; however, health advisories are used for sport fish. Ahmed et al. (1993) and Burger and Gochfeld (1996) argue that health advisories represent the least coercive form of governmental intervention and require people to assess the risks for themselves. Advisories cannot be exerted upon the whole population by authorities because they do not necessarily reach all segments of the population. Thus, there is uncertainty in the ability to protect the population with the use of health advisories. Accordingly, even in the case of "one to one" causal relations, we need to consider the principle of fostering autonomy.

Morgan and Lave (1990) and Fischhoff (1987) also argue that we have a responsibility to make sure that people understand the health risk communication and that we understand the harms and the benefits produced by risk communication. This means that we also must foster an understanding of the barricade or the health advisory and thereby foster people's autonomy as well as providing immediate protective actions. This is not compatible with manipulation or coercion.

Hague and Murray in 1930 (see section 1.5.2), and more recently Faden and Beauchamp (1986) (see section 2.5.1), argue for persuasion because coercion and manipulation do not provide understanding as they do not foster autonomy. Socrates says: "Shall we say there are two forms of persuasion, the one producing belief without knowledge and the other knowledge" (Gorgias, line 454e). Knowledge is produced when a person knows the reason behind the verbal injunction or the barricade, when they have learned, and have not been indoctrinated by the power of the speech and delivery of a risk communicator, rhetorician, or secular evangelist. Thus fostering autonomy is promoted to fulfill the principles of beneficence and non-maleficence (see section 2.6)

With acutely toxic chemicals, where the toxic chemical is the immediate cause of an adverse effect, we need to foster autonomy, such that people know why something is a harm and know how to stay out of harm's way. Both the quantitative and qualitative aspects of risk need to be communicated: both the hazard identification and dose-response. Because public health does not invariably have a good dialogue with the public and has difficulty reaching people, fostered autonomy enables people to help other people stay out of harm's way as well, expanding the reach of public health risk communication.

However, strong paternalism does not solve the problem; we cannot ban the toxins in shellfish or barricade the oceans, and we could not barricade the acutely toxic emissions in Seveso, Italy, Bhopal India, or Chernobyl, Ukraine. The tragic accidents like the disasters in Bhopal or Seveso provide the impetus for community "right to know" programs. This is the second aspect of fostering autonomy (see section 1.4). There is a large body of information on "right to know", and generally, communities are to be involved before an accident happens to develop preventive and emergency response programs (Baram and Partan 1990, Collins 1992). The "right to know" is a person - oriented ethic, not a consequentialist ethic and specifically not a risk, chemical or substance - oriented ethic. "Right to know" places a responsibility on public health practitioners to develop an understanding of the health risks within the community, thereby fostering the autonomy of the people in the community.

Does the "right to know" require that the entire community become experts in all areas related to the risks - the science, risk assessment, and ethics? As suggested previously, there is an inherent weak paternalism in public health through the control of health risk information, and this cannot be escaped, as neither the public nor risk managers will be able to become experts in all of the relevant areas of expertise.

Ahmed et al. (1993) argue that the issue of advisories has no effect on the impact on the source of hazardous chemicals. Indeed, how will notifying the affected communities change the release of chemicals in the first place? Often the release of chemicals and the subsequent bio-accumulation in fish are separated in both distance and time, and indeed this is the failing of purely consequentialist approaches (see section 1.3). Furthermore, Ahmed et al. (1993) suggest that we lack programs to monitor levels of chemicals, and the exposure assessment is uncertain. Risk communication processes must also help people assess societal risk so as to enable their participation in the regulation of chemical inputs in their communities.

We need to explore the ability of the "Right to Know" doctrine as an effective means of achieving distributive justice. The legal limitations on the freedom to discuss risks, coupled with the inherent weak paternalism of public health, pose serious barriers. We do not have a mechanism to talk openly about risks, nor the will, despite the claims for "an open approach". There is a need for a process of informed consent analogous to that developed for the practice of medicine, whereby the community, public health departments and the relevant industries regulate and decide on the chemical risks collectively through a joint ethical narrative. A practical approach is developed in Chapter 5.

Ashford implies that as the uncertainty in the causal relation increases, the relationship of fostering autonomy to beneficence and non-maleficence moves away from that of the "one to one" causal relationship. These cases will be explored in the next series of chemical risks, complex causal relationships.

3.5 Complex Causal Relationships: "Many to One" and "One to Many"

As we move from the simple case where an immediate cause can be known, the application of the ethical principles becomes increasingly difficult. For many health effects there are too many causal factors to be considered in a well-defined context, and each causal factor may not determine the effect uniquely. Hill (1965) suggests "one to one" relationships are not frequent. People are exposed to complex mixtures of chemicals and not to one chemical at a time (E.P.A. Presidential Commission 1997). The effect of complex mixtures results in quantitative and qualitative changes in the toxicity as a result of changes in the absorption, distribution, and metabolism of the chemicals (Krishnan and Brodeur 1991). The presence of complex mixtures may increase the toxicity of a particular chemical, a synergistic effect. On the other hand, a complex mixture may be beneficial through reducing the toxicity of a particular chemical, an antagonistic effect. Or, the presence of other chemicals may not change the toxicity of a chemical. The causal relationships that exist in the "one to one" situation may change in the presence of complex mixtures. Two general types of causal relationships that explain these situations are the "one to many" and the "many to one" (Bohm 1957).

The "many to one" causal relationship means that several different factors, or different pathways, can be involved in producing a similar effect. For example, the impairment of intelligence is produced by many chemicals, like alcohol, lead and mercury. The relations are contingent on nutrition and social environment. The cause of intelligence deficit is a "many to one" causal relationship.

Numerous chemicals are also involved in "one to many" causal relationships, where one chemical can be involved in a variety of health effects. This is common for receptor-mediated health effects that result in gene activation, in particular activation of metabolic enzymes in the liver, or that bind regulatory enzymes.

Nicotine is believed to be related to both tumour initiation (i.e., a genotoxic mechanism) and tumour promotion (i.e., a nongenotoxic mechanism). The N - nitrosamine metabolites of nicotine are genotoxic, meaning they cause DNA mutations (Preussmann 1980, Hoffman et al. 1994, Hoffman and Hecht 1996). Nicotine is believed to cause tumour initiation through the binding of its metabolites to DNA, which results in mutations in DNA. Furthermore, the endogenous production of free radicals, which cause mutations in DNA, also appear to increase the ability for the nicotine metabolites to bind to DNA (Weitberg and Corvese 1993). Nicotine itself is believed to cause tumour promotion by inhibiting apoptosis, the process where the cell actively participates in its own death (Wright et al. 1993, Maneckjee and Minna 1994). The mechanism through which nicotine causes tumours has been reported in some experiments to be through a protein kinase C mechanism (Schuller and Orloff 1993, Schuller et al. 1995). Nicotine is involved in "one to many" causal relationships in cancer processes alone, and other causal relationships if we include the effects on the brain.

Similarly, dioxin and microcystin, two of the most potent tumour promoters in experiments, interact with the phosphorylation regulation mechanism. Dioxin activates protein kinase C, like the phorbol ester class of carcinogens (Carrier et al. 1992, Wolfe et al. 1993, DePetrillo and Kurl 1993, Enan and Matsumura 1995, Zorn et al. 1995). Microcystin specifically inhibits serine/threonine protein phosphatases by binding the enzyme, like the okadaic class of carcinogens (Lambert et al. 1994a and b). DNA breaks also have been demonstrated for both microcystin and dioxin.

Benzene and its metabolites, catechol and hydroquinone, which are found in tobacco smoke and car exhaust, have been shown to activate protein kinase C and influence invasion and metastasis (Gopalakrishna et al. 1994). Catechol and hydroquinone also are known to bind to DNA forming 8-hydroxyguanosine adducts (Lagorio et al. 1994). These chemicals, like nicotine, are involved in "one to many" causal relationships just considering cancer.

Lead and alcohol cause some neurological effects through a protein kinase C mechanism (Markovac and Goldstein 1988, Roivainen et al. 1995). Interestingly and controversially, electromagnetic fields have been reported to cause increases in protein kinase C activity as well (Adey 1990).

The above chemicals therefore may possibly be involved in common and diverse health effects as they share a common mechanism, the interaction with the kinase/phosphatase signal transduction. This mechanism is involved in cell processes as diverse as the cell cycle and memory (Cohen 1992). The crucial problem is that the experimental results are all for individual chemicals in experiments and not for complex mixtures. Our knowledge is based on "one to one" causal relationships. The scientific evidence that contributes to the hazard identification for individual chemicals and the development of dose-response relationships rarely contains data for the presence of the complete spectrum of mixed causal factors that can be involved in any particular effect.

Most "one to one" causal relationships are a result of exposures that are at much higher doses than people experience in the environment. It is tacitly presumed that the data can be extrapolated to determine a lower dose, below the apparent threshold in the "one to one" experiment, at which point there would be safe exposure or little risk; that is we assume that we can extrapolate quantitatively to lower doses without having to consider qualitative changes, i.e., the affect of additional chemicals and the new relationships between these chemicals and the particular cell processes. As the dose decreases, the significance of the one chemical decreases and the need for accounting for other chemicals increases. An experiment by Takayami et al. (1989) demonstrates the problem for cancer endpoints, as Krewski and Thomas (1992) say:

> Takayami et al. studied the effect of dietary exposure to a mixture of 40 known carcinogens at low doses, each administered at one - fiftieth (1/50) of the daily dose estimated to half (TD50) the number of tumour free animals by the end of a 2 year study. Both neoplastic nodules of the liver and follicular cell tumours of the thyroid were markedly increased in the animals. Of the 40 chemicals, only 20 are known liver carcinogens, and 5 are thyroid carcinogens. Although no such effects would be expected if any one of the 40 carcinogens were administered in isolation. (Krewski and Thomas 1992, p. 106)

The serious problem is that cell processes are regulated throughout the body by a variety of mechanisms, in particular to the chemicals discussed above through the kinase/phosphatase signal transduction mechanism. The overall regulation of kinase and phosphatase pathways in cells is very complex and not a simple "one to one" relationship (Hunter 1995). The complexity has been demonstrated by the observation that sometimes the activation of protein kinase activates apoptosis and at other times inhibits apoptosis (Lavin et al. 1996). Similar unpredictable effects occur with cell proliferation. The changes that take place are dependent on the particular contextual details in the cell and surrounding tissue. Presumably the cause is a result of the complex interactions between many cell processes. A similar complexity is observed with respect to DNA methylation and regulation of gene expression, and its role in the carcinogenic process (Counts and Goodman 1995, Mostoslavsky and Bergman 1997). The risk to biological organisms cannot be predicted from single chemical experiments or by adding together the single doses of chemicals in a matrix, as in the hazard index method, where the risk of a complex mixture is calculated as the sum of each chemical dose divided by its predicted safe dose (Teuschler and Hertzberg 1995).

In cancer risk assessment, only the end-points which have been identified and are quantifiable can be used to develop quantitative risk assessments (Capen et al 1995). This is a problem for non-genotoxic chemicals. Chemicals are considered carcinogenic primarily if they cause an increase in the incidence of tumours or plaques in an experimental animal, or directly bind to DNA. If a chemical interacts with receptors involved in the cell cycle or activates gene expression of proteins involved in cell regulation or p450 enzymes, but does not cause an increase in tumours in the experiments developed, then predicting the risk quantitatively is very difficult, if not impossible. For example, consider the case of the 20 non-liver carcinogens in the above experiment (Takayami et al. 1989). How would we think of them if they had been scientifically examined only 'one at a time' and not within the complex environment? Risk assessors might argue that "we know these are not liver carcinogens" and thus we do not need to consider liver cancer end-points. Assigning a chemical the status as 'carcinogen' is a contentious task.

In considering the full spectrum of causal factors in understanding and predicting health effects, many factors may be involved in any particular effect. The overlap in mechanisms of many different chemicals and health effects complicates the epidemiological picture. The relative difference in health risk between individuals exposed to different chemicals may decrease as everyone is effectively exposed. For example, everyone has an endogenous background concentration of nicotine, benzene, lead, dioxin, benzo(a)pyrene, countless other active chemical agents, and is exposed to electromagnetic fields. The question has been raised: has epidemiology reached its limits (Taubes 1995)? We need to develop specific molecular techniques to tease out these complex relationships and strengthen our epidemiological research (Sheilds and Harris 1991).

3.6 Communication Concerning Complex Mixtures: Tobacco and Nutrition

The conception of science and risk assessment (see section 3.2) is wonderfully illustrated by consideration of the development of knowledge of the causal relationship between the chemicals in tobacco smoke and cancer. This case shows the historical progression of scientific subjectivity and that the uncertainty in the theory - which causes and which effects to examine - is a major problem in risk assessment.

Tobacco smoke is a complex of some 2,000 chemicals and is considered the greatest single cause of cancer, and the most preventable causal factor. Tobacco smoke exposure is quite visible with the naked eye, yet we did not begin seriously *deliberating* the diseases related to tobacco smoke, or environmental tobacco smoke, for about 100 years after the advent of the cigarette (see Dostoyevsky's observations from 1866 in note 3.11). The first cigarette factories opened in Havana Cuba in 1855, London England in 1857, and Richmond Virginia in 1863 (Tomatis et al. 1997).[12]

The pertinent historical papers, in particular from the *Canadian Journal of Public Health*, demonstrate the consequences of the uncertainty in the theory - the harm that results, and the pragmatic value in adopting a Socratic approach to public health practice. The historical analysis provides an important contrast of the deeds of 'public health' with the ethical *desideria* expressed in the journal over the same time frame (see section 1.5).

3.6.1 Historical Perspective on Tobacco and Cancer Risk Communication in the Canadian Journal of Public Health

1929-1932

McIntosh (1929) states that a variety of observations, experimental and otherwise, inculpate smoke and tar as causative factors in cancer, especially lung cancer. McIntosh cites the four to five times higher incidence of cancer in coal burning areas of France and Staten Island, N.Y. Tuberculosis is also considered as a key factor in lung cancer. Miller (1930) also discusses the possible relation between tuberculosis and lung cancer.

McCullough (1932) notes that cancer mortality has increased from 69.4 to 109.5 per 100,000 from 1914 to 1930, but cautions that the population has increased in mean age because of fewer deaths at younger ages. McCullough claims that "cancers of the lip, tongue, floor of the mouth, inside cheek and in the throat are incited to grow through the influence of tobacco, bad teeth, and syphilis", and that tobacco, alcohol, and hot food cause cancer of the oesophagus. Minimization of tobacco and alcohol use is deemed the possible line of prevention of cancer.

1933-1934

Bulmer (1933) cautions that chemical occupational diseases are not spectacular like "poisoning", that "most industrial diseases are produced by the introduction into the body over a long period of time of relatively small quantities of toxic materials, hence their onset is usually slow and insidious" (Bulmer 1933, p. 157). Bulmer is observant of the health risks from chemicals, including the dust that collects within the workplace as well as lifestyle habits like drinking alcohol. But surprisingly, considering his insights on the nature of chemical hazards, Bulmer does not mention smoking tobacco, some 2,000 chemicals, as a potential health risk.

Bloodgood (1933) suggests that cancer results from chronic irritation and every single injury to the body. Bloodgood also believes that "women are teaching men how to smoke with very little risk of cancer, because they keep their teeth clean and see their dentist frequently" and this mitigates the risk of lip and oral cancer (Bloodgood 1933, p. 564). Surveys indicated that women were more educated about cancer prevention.

MacKlin (1934) asks: "Does pipe-smoking cause cancer of the lip?" MacKlin first notes the higher prevalence of cancer of the lip in men than women, and that more men smoke pipes. However, MacKlin notes that these cancers have increased 10 times in women over the previous 30 years, and women do not smoke pipes. MacKlin concludes that "unless we revise our ideas and incriminate the tobacco instead of the hot pipe stem, we are put to it for an explanation of the tremendous increase of lip and mouth cancer among women in Canada" (MacKlin 1934, p. 370). This is an example of creative insight not passive observation.

1937-1940

In 1937, Zeidler and Wagner discuss the danger from high lead and arsenic in Canadian tobacco from unlimited use of insecticides. Levels of these metals in tobacco were reported to be 50 to 100 times the allowable content in food. Interestingly, tobacco did not fall under the food laws. Zeigler and Wagner do not mention the health effects from actually smoking tobacco.

A book review on Hoffman's (1937) *Cancer and Diet* suggests that it "is reasonably certain that the antagonists and protagonists have many stormy years ahead of them" (Sellers 1937, p. 522). Hoffman's book details the early theories of cancer causation. Those cited who suggest tobacco as a cause include Bulkley (1915) who says: "The irritant effect of tobacco should not be overlooked in regard to mouth lesions. But of the millions who use tobacco only very few are affected with cancer, and only those who are predisposed thereto by some metabolic disturbance" (p. 488). Shaw (1907 and 1924) suggests the causes of cancer were a deficiency of vegetable foods, especially those containing sulphur, excess of animal food, abuse of alcohol, tea, tobacco, and drugs. Dobson (1927) says: "No doubt if tobacco had never been discovered cancer of the mouth would be less common than it is, but as we have seen, tobacco is only one factor" (p. 70). Craver (1933) argues from the difference in incidence of cancer in the social classes that different habits were the cause, suggesting cancer of the esophagus is caused by tobacco and alcohol as the first and second probable causes.

In Hoffman's (1937) own study, tobacco smoking is associated with increased cancer. Hoffman, referring to his early study of 1915, writes: "The conclusion is advanced that the greater frequency of cancer of the lip among men is directly attributable to the smoking habit, and the evidence of tobacco misuse was apparently established in 16% of the male cancer cases" (Hoffman 1937, p. 488). In 1931, Hoffman concluded that:

> 1. Smoking habits unquestionably increase the liability to cancer of the mouth, throat, the oesophagus, the larynx, and the lungs.
>
> 2. The change in the cancer rate during most recent years has not been at all disproportionate to the enormous increase in cigarette - smoking habits.
>
> 3. The problem is complicated by other factors, particularly syphilis and defective dental conditions, in the absence of which, smoking habits are much less likely to result in cancerous affections.
>
> 4. The increase in cancer of the lungs observed in this and many other countries is, in all probability, to a certain extent directly traceable to the more common practice of cigarette smoking and the inhalation of cigarette smoke.
>
> 5. In the absence of other predisposing conditions, extreme moderation in smoking habits would certainly be advisable.
>
> 6. Finally, something should be said about the gross amount of air pollution as the result of almost universal smoking habits, which may in some cases injuriously affect non-smokers who are victims of conditions over which they have little control. This observation applies particularly to the development of cancer of the lungs which occurs among women, as well as among men, and frequently among those who are not smokers.

Interestingly, Sellers does not mention the relationships of smoking and cancer in his editorial and only emphasizes the association between cancer and high energy or excess calorie intake in the diet (Sellers 1937).

In 1938, Sellers says lung cancer in Ontario represents 5% of male cancers and 2.6% of female cancers, cancer of the buccal cavity represents 5.3% of men and 0.9% of women (Sellers 1938). The age-corrected rate of cancer mortality increased from 57 to 90 per 100,000 from 1909 to 1936. Sellers states that improved diagnosis explains part of the increase in the mortality rate and is a significant factor, as suggested by the tremendous increase in the death rate for male cancers at inaccessible sites, but that some of the increase is real.

Barrett (1938) discusses smoke pollution in Toronto, suggesting that it is as bad as any other major city and postulates that smoke is probably related to health, as smoke particles are observable in the lungs of urban dwellers. He notes that there has been a marked increase in respiratory disease in Pittsburgh since 1875.

1947-1949

Stovall (1947) discusses the basic outline of the theory of cancer based on Potter (see section 3.1) with causal environmental factors for cancer: excessive exposure to sunlight, irradiation, chemical carcinogenic agents in industry, high caloric intake, and heredity effects. Stovall does not specifically mention tobacco smoke or air pollution, but does mention Pecival Pott's identification of cancer in the 19th century and the recent isolation of carcinogenic agents from chimney soot. Stovall notes the 35% increase in cancer deaths in comparison to a 2% rise in other deaths in the U.S.. He says that, although science has brought many advances in diagnosis, "it is doubtful if these advances have spread rapidly enough during this single ten-year period to account for the increase in the incidence of cancer" (Stovall 1947, p. 416). Stovall emphasizes environmental factors in cancer causation because these were avenues of prevention, much like Socrates' vision of risk management (section 2.3): "the new slogan may be PREVENT CANCER WITH KNOWLEDGE" (Stovall 1947, p. 420). Stovall also suggests: a decentralized institutional approach to cancer prevention with preventive medicine being integrated by means of all practitioners, and that cancer cannot be controlled in highly specialized centers, far removed from farms and homes located in the counties, villages and small cities throughout the country (see section 1.2).

McKinnon (1949) discusses the change in cancer mortality in Ontario from 1921-1947, and says:

> The increase in cancer of the pulmonary system accounts for one-quarter to one-half, in different age groups, of the increases in the male cancer mortality, whereas there is no increase in this category in the

> female. To what extent this increase in pulmonary cancer mortality in the male represents an inclusion from without the cancer group, or a shift within the cancer group, or an actual increase in pulmonary cancer itself, it is quite impossible to say. If it is a real increase in this type of cancer (a highly controversial question), then a very considerable part of the increase in the male cancer mortality is accounted for by this alone. (McKinnon 1949, p. 345)

McKinnon argues that the "general increase in the male rates is reasonably attributable to greater improvements in final diagnosis and possibly, in part, to some actual increase in pulmonary cancer in the male." McKinnon does not mention smoking in males as possibly contributing to the increase in pulmonary cancer, nor any means of prevention. McKinnon argues strongly that the lack of any decline in cancer mortality rates demonstrates the failure of early treatment to prevent death.

1950-1958

Watson (1950) discusses the incidence of cancer in Saskatchewan for 1948; the incidence in males of lip cancer is (33 per 100,000), mouth and throat (3 per 100,000), larynx and pharynx (2 per 100,000), and lung (13 per 100,000), and these account for 233 of 1,036 male cancers that occurred in 1948. Watson suggests that "death rates, which are necessarily compiled from death certificates, are far less reliable than statisticians would like or profess to believe" (Watson 1950, p. 311). Watson claims to be "cynically" challenging McKinnon's arguments based on mortality data, that early prevention has no effect. Watson does not discuss causative factors of cancer.

A short editorial by Wilton (1950) comments on A.J. Lanza's paper at the Smoke Prevention Association of America, claiming that industry is solving its air pollution problem, that air pollution dates back centuries before the industrial era. Wilton notes smoke particles from tobacco and motor cars are the source of some of the contaminants of concern. Reference is made to Dr. Dublin's comments on smoke and cancer of the lungs, that the data could not be interpreted as indicating a close connection between atmospheric pollution and respiratory cancer. He claims that "statistics were misused for propaganda purposes" and that smoke pollution is a nuisance, but "in light of the available evidence it cannot be stated that it can cause specific disease or death to any considerable degree" (Wilton 1950, p. 140). Wilton concludes that every resource should be made to provide an atmosphere free from annoying or dangerous impurities.

Sellers et al. (1950) discusses the incidence, prevalence and mortality of cancer in 1939. Respiratory cancer and buccal cancer were separated and not considered as related. No comment is made with respect to smoking as a causal factor, but improvement in the quality of medical certification, accuracy of diagnosis, together with changes in the age structure of the population are discussed as factors influencing the recorded increase in cancer mortality. They also suggest that the incidence and prevalence of cancer is not subject to fluctuations like infectious diseases.

Wylie (1951) introduces the mathematical concept of the comparative mortality ratio: CMI = deaths in year X/deaths in base year. Wylie says the "increase in cancer of the respiratory system is very marked and the relative increase of male to female mortality has the same ratio (2.3) in England and Wales as in Canada." The percentage change in mortality for lung cancer in the periods 1933-1934 with 1943-1944 was reported as 100% for males and 43.5% for females in Canada. Wylie does not mention any causative factors.

After 1934 it seems as if tobacco smoke was invisible to the eyes of the *Canadian Journal of Public Health* as it is not discussed as a causative agent. Surprisingly, there are no papers or editorials discussing lung cancer and tobacco smoke in the *Canadian Journal of Public Health* in the early fifties, despite the famous studies of Doll and Hill, published in 1952 and 1954 in the *British Medical Journal*, on the relationship between smoking and lung cancer. In 1952, Doll and Hill conclude from a retrospective study that a real association exists between carcinoma of the lung and smoking, but not necessarily a *causal* relationship. In 1954, Doll and Hill, with a prospective study of physicians classified according to their smoking habit, demonstrate a crude dose-response relationship between daily average smoking and lung cancer, respiratory disease, and coronary thrombosis.

The Doll and Hill studies support four previous American investigations in 1950: two studies in May 1950 in the *Journal of the American Medical Association* (Wynder and Graham and Levin et al.) and two papers in *Cancer Research* (Schrek et al. and Miller and Porter). Schrek et al. (1950) says that "for every expert who blames tobacco for cancer of the lung, there is another expert who says tobacco is not the cause" (Schrek et al. 1950, p 49).

Part of the problem, up to ~1950, with linking tobacco smoke and lung cancer unequivocally, was the inability to demonstrate a causal association in an experiment. In 1952, Essenberg published an animal experiment in *Science* which demonstrates cancer is caused in animals exposed to tobacco smoke in a smoking machine (one cigarette every hour for a 12 hour day, and the chamber cleared of smoke at 9 minutes after each cigarette). The experiment lasted for 1 year. Of 25 mice in the experiment, 21 had definite primary neoplasms of the lungs, two were negative and two were uncertain. There was contingency in the causal relationship. The experiment was repeated with 36 mice and controls, of both sexes. Interestingly, exposed mice did not reproduce any young, while the controls reproduced freely.

A second aspect of the problem of relating smoking to lung cancer was the inability to isolate a carcinogenic agent. In 1954, the *British Medical Journal* (BMJ 1954, p. 1213) had an editorial on carcinogens in cigarettes, discussing the "highly important" isolation of 3,4-benzpyrene in cigarette smoke. The exposure to benzpyrene in a 40 cigarette a day smoker is calculated as 150 micrograms in comparison to that present in air pollution at 200 micrograms. The *Canadian Medical Association Journal* picked up the editorial, adding the comment that "it is difficult to give a quantitative picture of risk from inhalation of these amounts of carcinogen, since the resistance of human epithelium to the carcinogenic stimulus of benzpyrene is completely unknown, and that the chronically inflamed respiratory mucosa of the heavy smoker may be readily affected" (CMAJ 1955, p. 305).

Why did the Canadian Journal of Public Health not report any of these findings in an editorial? Even now an explanation would be of value. In contrast, in the *Canadian Medical Association Journal*, DeLarue (1952) notes the American studies and comments on the sound statistical evidence relating the influence of excessive and prolonged cigarette smoking to the striking increase in the incidence of lung cancer in Canada and world wide. DeLarue (1952) even notes an increase in lung cancer in the small population of the Toronto General Hospital over a three year period.

Phillips (1954), in the *Canadian Medical Association Journal*, presents the changing proportion of cancer deaths attributed to lung cancer from 1931-1952 in Canada. The increase is from 3.0% to 13.4% for males and from 1.4% to 3.2% for females. The male age - standardized death rates are also presented as increasing from 3.0 to 17 per 100,000 over the same years. The relationship to tobacco smoke is not mentioned. Interestingly, Phillips (1957) briefly mentions (in one paragraph) this study in a paper in the *Canadian Journal of Public Health*, but says: "There is considerable doubt regarding the reliability of such analyses since it is impossible to measure the relative accuracy of the data on the death certificates or the degree of improvement in the diagnosis of lung cancer" (Phillips 1957, p. 180). Phillips again does not discuss the possible role of tobacco smoke or prevention of lung cancer.

In 1958, with Godden's article, the *Canadian Journal of Public Health* published, for the very first time, the relationship between tobacco smoke and lung cancer. Where is the action to justify all the public health rhetoric of "prevention"? Defries (1954) reemphasizes that Dr. Playter in 1873, the founder of the *Canadian Sanitary Journal* (which became the CJPH) and pioneer in the public health movement, stated in the first issue: "Its purpose is to diffuse a knowledge of, and awaken interest in, the laws of health; to advocate sanitary legislation; and to make prevention rather than cure the first object of both the physician and the public" (Defries 1954, p. 7). This is very similar to the mandate of the first "Canadian Public Health Association" in Canada (see section 1.5.1). Where is the public health "paternalism" - the critical evaluation of science and action to protect Canadians - the support for the claim that "public health knows best"?

Godden (1958) begins his paper entitled "The Prevention of Carcinoma of the Lung" with a quote:

> A recent editorial in the New England Medical Journal entitled "Tobacco and Health", says "like a championship chess game, the tobacco-cancer controversy develops a series of moves and countermoves made before a passive and confused public....
>
> Not to mention with a relatively silent position like those who market a distilled liquor without denying the evils of drink, the tobacco interests have now shown themselves assertive and aggressive... They have entered the medical fields, including oncology, with a new periodical, Tobacco Health, and 127-page science booklet, Science Looks at Smoking, distributed gratis to stockholders of the American Tobacco Company...
>
> A deadly serious discussion awaits a final verdict, by the impartial methods of biology and science, and most consumers are in no position to decide the facts. They need to hear the dispassionate opinion of experts, an opinion that is allowed to express itself objectively and without immediate countermoves by those who have incentives other than reaching the correct decision".
>
> Knowledge of the role of tobacco-smoking in the causation of cancer of the lung and other morbid processes has advanced sufficiently to require the serious consideration of every member of the medical profession. (Godden 1958, p. 232)

In recent times, Leiss (1995) (see section 1.2) describes environmental health as the "risk poker game", and here we have the metaphor expressed as a "chess game". This short commentary sets the chess board for environmental and public health. The "science expert" is defined as the calm risk player who has transcended the chess game. But as the "quiet chess game" is continuing in public health we should not be swayed by such romantic images of experts or science (see alcohol and pesticide discussions, sections 3.7 and 3.8).

Possibly, the chess game is partially a result of public health scientists following the Hippocratic tradition, the *Decorum* - "performing all this calmly and adroitly, concealing most things from the public while you are attending him", or possibly "serving the science" rather than the public (see section 2.3). If "public health" were following Socrates, serving the public while playing their "risk games", then possibly public health providers would have attempted to have the public "think for themselves". How would the chess game be different? Would the public know that a game is indeed being played, rather than "public health" playing games with the public's health?

Douglas (1930) argues that we advocate "no unsound theories" (see section 1.5.2). Did the *Canadian Journal of Public Health* follow this advice? The first official position of the journal appeared in 1964, stating that cigarettes are a hazard to health and cause lung cancer, and that all efforts should be made to educate the public of the hazard, in particular the youth (Defries 1964). Phillips published a paper in 1964 suggesting: "From the clinical and public health viewpoint, the data from retrospective and prospective investigations justify acceptance of an effective etiological relationship between smoking and disease, especially lung cancer." And against Socrates, continues: "This conclusion has been reached by a number of official scientific bodies in many countries. From the practical standpoint we must agree that the scientific evidence establishes beyond reasonable doubt that cigarette smoking is a causative factor in the rapidly increasing incidence of human lung cancer" (Phillips 1964, p. 15).

The *Canadian Public Health Association* officially supports a total ban on cigarette advertising in 1971 (Mathews 1971). It could be argued that communication before unequivocally knowing the harm would amount to introduction of the harm of misleading the public and causing undue alarm. This is the difficulty faced in risk communication of low-level exposure to chemical contaminants in food (see section 8 below). But how do we then apply the concept of prevention?

Adopting the Socratic position, the editorial board could have written a commentary suggesting that a "chess game" was taking place on the health effects of smoking tobacco and, in Socratic tradition, stressed that they are ignorant with respect to the health effects but aware of the public's "right to know". Professing ignorance would have mitigated the risk of misleading the public. The public could have begun "thinking for themselves" as early as 1866 if they read *Crime and Punishment* (see note 3.11), in 1915 with Hoffman's evidence (see Introduction and 1937 above), or 1932 to 1934 with arguments from the journal, i.e. the public could have placed smoking in the deliberative realm much earlier than 1964. It could be argued that the inaction of public health helped perpetuate the very detrimental and ignorant "individual choices" of Canadians prior to this time, leading to the deepening cultural activity of smoking tobacco.

If we follow Socrates, then the problem of the indeterminacy in the theory, which causes and which effects, would not be borne by the public in complete ignorance. We need to ask: Is the harm of complete ignorance greater than the harm of being unduly alarmed? This question enters as part of the inherent weak paternalism of public health practice. Can we justify maintaining this weak paternalism unchanged, or can we see a new approach? The first move of the *Canadian Journal of Public Health* could have been to foster the autonomy of the public and their "right to know" that there was a "chess game" in progress. Also, as the "chess game" progressed, the public could have been kept informed by *chess advisories* periodically until the evidence of risk passed from ignorance to reality, when health advisories could then be issued.

At this time, there are millions of people addicted to tobacco products and exposed to environmental tobacco smoke; in particular, families of people who smoke and people who work in public places where smoking is tolerated. Is it possible for people to mitigate the risks caused by exposure to tobacco smoke?

3.6.2 Diet: Towards a Socratic Approach to Prevention

How should we handle public health risk communication ethically? Diseases related to tobacco smoking, breathing environmental tobacco smoke and air pollution, can be thought of as a "one to many" or possibly a "many to many" causal relationship. Smoke is a complex mixture of 2,000 chemicals related to many health effects. The communication problem is further complicated because air pollution and tobacco health risks are cultural and social in nature. Smoking tobacco is largely a twentieth-century craze developed with the advent of the cigarette, maintained through the addictive and habitual nature of smoking, the lack of public health education for the better part of the century, and the tobacco industry risk communication campaigns (Roemer 1993). In 1988 in the U.S.A. alone, the tobacco industry spent $3.27 billion in advertising and promotion (Roemer 1993).

Previously, we discussed the risk of nicotine. At this point we may ask, why focus on nicotine since there are 2,000 chemicals in tobacco smoke? Why not just consider the tobacco diseases as a "many to many" causal relationship? The one complex product causes the many diseases, and perhaps therefore, we do not need to be concerned with just the one carcinogenic chemical. However, nicotine is the active agent that people want to consume. People become addicted to this chemical, and commercially available sources of nicotine are now being promoted on both television and by healthcare providers as a means to quit tobacco products. Kay (1950) describes nicotine as the very dangerous pre-world war II pesticide that has caused a large number of deaths with toxicity second only to the new organic phosphates. Therefore, we also need to communicate about just nicotine. Our problem is that the epidemiological evidence is for the 2,000 chemicals and not for nicotine *per se*.

Health risk communication has been aggressive with respect to tobacco in the last 20 years, and this is largely supported by strong epidemiological evidence that links smoking tobacco with disease, in particular lung cancer (Roemer 1993). However, it took

15 years after the health consequences were significantly documented in 1950 before health advisories were first issued in 1965, 100 years after cigarettes were first produced.

Air pollution and environmental tobacco smoke are now being recognized as contributing to health effects, supporting Hoffman's claim of 1937 (E.P.A. 1993, Cotten 1993). In particular, the "Harvard Six Cities Study" in the U.S.A. concluded that air pollution kills below levels currently considered safe, and particulate matter has been estimated to cause 60,000 deaths per year in the U.S.A. (E.P.A. Presidential Commission 1997). Air pollution levels for the common pollutants are now reported daily on the Weather Channel in Canada. However, as discussed in the introduction a recent evaluation of smog advisories asks the question: Do smog advisories work? The results report that advisories do not prompt action because people claim, "There was nothing I could do". Indeed, how do you remediate the air? But is there really nothing that people can do? Can this same logic be applied to smoking tobacco? What can smokers do to mitigate the risks if they do not stop smoking?

At the present time, smoking advisories on cigarette packages only inform of the health effects: smoking kills, smoking harms the fetus, etc. The smoking warnings do not answer the complaint about air pollution advisories; tobacco advisories do not provide people with information on "what they can do". If we consider health effects from the aspect of contingency, rather than causation, we can provide people with a solution to this complaint.

Nutrition is a "many to many" causal relationship and a large contingency in many diseases, in particular those related to health effects from chemicals. A variety of nutrients in proper dosage (vitamins, minerals, proteins, and carbohydrates) within a particular person are continually needed to produce a healthy body and mind in the moment. All of the nutrients are needed and an excess of one nutrient does not make up for a missing nutrient; excess vitamin C does not make up for a deficiency in vitamin A. Potter and Steinmetz (1996) suggest that the anticarcinogenic properties of phytochemicals are known to be able to alter the likelihood of cancer at almost every stage of the cancer process.

Where are we in the "chess game" of the protective effects of fruits and vegetables? In epidemiological studies, regular consumption of fruits and vegetables is associated with decreased risk of cancer (Block et al. 1992, Potter and Steinmetz 1996). A general theory is that fruits and vegetables contain anti-oxidant chemicals that can trap free-radicals and inhibit formation of N-nitroso compounds, decreasing the incidence of DNA mutations (Park et al. 1993, Hennekens 1994). Murakami et al. (1996) reviews the anti-tumour promotion effect of chemicals in fruits and vegetables, suggesting that hundreds of chemicals may have this property. Smoking tobacco also depletes the body of many essential vitamins and nutrients and thus a diet of fruits and vegetables may also serve to replenish the body of depleted nutrients.

An early study showed deficiency in vitamin A enhances the binding of benzo(a)pyrene to hamster tracheal DNA (Genta et al. 1974). Substantial research into the protective effect of Beta-carotene as a dietary supplement, one of about 600 natural cortenoids (vitamin A compounds), has produced conflicting results, some suggesting the supplements of the vitamin actually increase the risk of lung cancer (Mayne 1996). Block et al. (1992) emphasize that "the search for a single protective nutrient, a magic bullet nutrient, however, has led to an insufficient appreciation of the strength and consistency of the evidence that fruits and vegetables themselves have an important protective effect against a very wide range of human cancers" (Block et al. 1992, p. 2). Fruits and vegetables may be said to have a "many to many" protective relationship and meet the Hill Criteria #6 and #7 (Table 3.1).

With respect to lung cancer, the protective effect of fruits and vegetables is statistically significant and consistent (Hill Criteria #1 and #2). Block et al. (1992) report that overall 24 of 25 studies reported a protective effect with an overall relative risk of 2.2. Zeigler et al. (1996) reach a similar conclusion in their review of the epidemiological evidence, that 8 of 8 prospective studies (Hill Criterion #4) and 18 of 20 retrospective studies show a protective effect of fruits and vegetables. Mayne (1996) suggest that the effect is greater if vegetables are eaten in the raw form rather than cooked.

Consistent dose-response relationships (Hill Criterion #5) between the amount of fruit and vegetable intake and decrease in the risk of lung cancer have been observed in prospective studies for both smokers and nonsmokers (Bjelke 1975, Kvale et al. 1983, Shekelle et al. 1981, Kromhout 1987, Fraser et al. 1991). Fraser et al. (1991) report a dose-response relationship for the protective effect of fruit (eating fruit 3 times/week, RR=1.0; 3-7 times/week, RR=0.39; >7 times/week, RR=0.32). However, Knekt et al. (1991) documented a significant dose-response relation for the protective effect of fruits and margarine for nonsmokers, but only margarine was protective for smokers. At what point do we claim that the dose-response relationship (criterion #5) is met?

The protective effect of fruits and vegetables has been documented in epidemiological studies for other cancers as well: larynx - 4 of 4 studies; oral cavity, pharynx - 9 of 9; esophagus 15 of 16; stomach - 17 of 19; colorectal - 20 of 27; bladder - 3 of 5; pancreas - 9 of 11; cervix - 7 of 8; ovary - 3 of 4; breast - 8 of 14; prostrate - 4 of 14; miscellaneous - 6 of 8 (Block et al. 1992).

This protective knowledge is not aggressively communicated to the public. In a 1992 survey of high school students (n=246) in Calgary, fewer than 10% suggested that eating fruits and vegetables may reduce the risk of developing cancer (McGregor et al. 1992). Is this maleficent? McHenry in 1949 says: "The $64 dollar question in health education, including nutrition, is what can be done to make people care?" (McHenry 1949, p. 271). McHenry says further that the general picture is one of confusion and contradiction (see Introduction). The results of Doll and Peto (1981) have been widely publicized suggesting that diet causes the majority of cancers (35%) although the authors stress the wide range of variability (10-70%), and further that the causes of up to 97% of all human cancers have a known etiology. This message is now being challenged, primarily that the causes are known for up to 97% of cancers, and that diet causes 35% of cancers (Schmahl et al. 1989, Tomatis et al. 1997). What needs to be emphasized is that FRUITS AND VEGETABLES ARE DIET. Fruits and vegetables do not appear to cause cancer, rather they appear to protect against cancer especially when a variety are consumed every day.

The risk of advising the public that fruits and vegetables have a protective effect is that the smoking public may feel that they can smoke tobacco safely because they may infer that the protective effect is as strong and clear as the risks to smoking. This may reduce the incentive to actually quit smoking.

We suggest that tobacco health advisories, and health advisories in general, should provide people with the positive information on fruits and vegetables, such that people can mitigate the health effects from tobacco, and chemical pollution more generally. However, it must be clear on the advisory that the protective effect is not "guaranteed". There are contingencies and we are ignorant. Perhaps we should spend our health money on providing people with fruits and vegetables to falsify the "many to many" protective relationship, rather than on appealing, scientifically isolated "magic bullet" health drugs. Perhaps we should be more clear in informing the public of what we know and what remains unknown.

Fruits and vegetables are probably the best way that we can promote beneficence: prevent harm and promote the good. Why not take advantage of the advertisement space on cigarette packages so that those who need this advice the most can see the message, begin thinking about it, and then help themselves even if they do not stop smoking? The tobacco consumers should be made aware of this possibility and be motivated to take this positive risk. The positive effects of fruits and vegetables along with the negative health effects from smoking would make a well-balanced health advisory; an advisory that fosters autonomy, promotes beneficence and non-maleficence. Most importantly, it might also in the end lead to that most elusive of all determinants, the true motivation to quit smoking.

Importantly, I stress that I do NOT mean to imply that fruits and vegetables should be considered as an alternative to QUITTING tobacco products. The most certain means of reducing the risk of cancer from tobacco products is to STOP CONSUMING TOBACCO PRODUCTS and NICOTINE. We should grow fruits and vegetables on the tobacco fields.

3.7 Alcohol Health Risk Communication

Alcohol has been a part of social life for thousands of years. The detrimental health effects from excessive drinking are described in Plato's dialogues 2,500 years ago, as Eryximachus says: "My own experience in medicine has entirely satisfied me that vinous excess is detrimental to the human frame. And therefore I can never be a willing party to heavy drinking, as regards either myself or my friends - especially when one is only partially recovered from the excesses of the previous night" (Symposium 176d, p. 531). Socrates advised against excessive alcohol consumption and described the health effects as both positive and negative: good for the heart and the flame in low doses, and bad for the body and mind at large doses (see section 3.3.2). Plato advocates regulated drinking parties, much like the efforts to mitigate these health risks today; health risk communication motivating people to personally take control of the risk. Likewise, the Hippocratic corpus discusses both the harmful and beneficial aspects of drinking wine, and alcohol was used therapeutically as both a diuretic and a purgative.

Alcohol is discussed early in the *Canadian Journal of Public Health*, and McCullough (1932) advises that minimization of alcohol consumption is the way to prevent cancer. Alcohol is discussed for the first time as a social problem in the *Canadian Journal of Public Health* in 1948 (editor's claim). The editorial discusses the complete lack of data on alcoholism, the related health effects and argues that "public health" cannot ignore social medicine (Alcohol 1948).

The health risks of alcohol consumption have been well-documented now as both positive and negative: slight protection from coronary artery disease, sometimes happiness, but also alcoholism, fetal alcohol syndrome, cirrhosis of the liver (Ahmed 1995). Further, alcohol has been consistently related to squamous cell carcinomas of the mouth, oral pharynx, larynx, and esophagus (Ahmed 1995). The detrimental social effects such as violence and homicide are certainly as or more important (Johnson and Chisholm 1989). The effects of alcohol and tobacco are greater than additive suggesting biological synergism. Doll and Peto (1981) attribute alcohol with causing 3% (variation of 2-4%) of all cancer deaths and they selected alcohol as the second most important carcinogen after smoking because of its interaction with tobacco smoke. Alcohol activates the liver enzyme p450IIE, which is capable of activating N-nitrosamines, and these are formed from nicotine (see section 3.3 above).

3.7.1 Alcohol and Breast Cancer

Recently an important link has been made between alcohol consumption and breast cancer. The increasing incidence rate of breast cancer has been observed in both Canada and the United States over this century. In the U.S. the breast cancer incidence rate has increased 1.2% per year between 1940 and 1982 in Connecticut (the State with the oldest cancer registry) and 4% per year between 1982 and 1986 in the U.S. as a whole (Harris et al. 1992). From 1973 to 1989 there has been a steady increase in the incidence, from 82.4 per 100,000 to 104.6 per 100,000 (Schatzkin and Longnecker 1994). The age-adjusted incidence shows an increase in every age group, generally increasing with age from less than 50 to over 65 (Sondik 1994). The National Cancer Institute calculates that 1 in 8 women will develop breast cancer over their lifetime (Sondik 1994).

In Canada, McKinnon (1949) discusses breast cancer over the first part of the century (1909-1947), and says that the breast cancer records in this period form a sounder basis for comparison and deduction than those of any other cancer; "in fact, breast cancer is the only major cancer that can be read with any degree of confidence" (McKinnon 1949, p. 259). This is attributable to the wide positive response of women to the merits of early diagnosis and treatment, because breast cancer was readily accessible for diagnosis as well as treatment and well-recognized in both its primary and secondary manifestations. McKinnon notes: "A marked increase in the rates of all age groups around 1920 shows clearly in itself that such rates cannot be taken at face value; it is only a paper increase, undoubtedly due to changes in diagnosis, certification and book-keeping" (McKinnon 1949, p. 257). However, since that time, he notes a continuing increase in the rates for women over 70 and a steady death rate in all other age groups. McKinnon suggests that "the sum factors, if any, tending to lower the rates, had approximately equaled and offset the sum of all factors, if any, tending to increase the rates" (McKinnon 1949, p. 259). The incidence of breast cancer in women has increased approximately 1.5% a year since 1980 for women over 50, and the incidence rate has remained approximately constant for women less than 50 in Canada (Statistics Canada 1993).

Weed (1997) points out that with respect to breast cancer and moderate alcohol consumption there has been a problem of incommensurability and underdetermination of the scientific data. Two reviews (Wynder and Harris 1989 and Hiatt 1990) of the same scientific data with respect to alcohol and breast cancer, both using the Hill (1971) criteria (Table 3.1), have reached "drastically different conclusions"; Wynder and Harris suggests that alcohol is not an important etiological factor while Hiatt suggests that women with risk factors may be wise to limit their alcohol consumption. As one example to show the discrepancy, Wynder and Harris suggest that because all studies have not shown an elevated risk the association is not consistent. In contrast Hiatt points out that since 10 of 16 case-control and 5 of 6 cohort studies were positive the association is fairly consistent (Weed 1997).

At what point do we argue the results are consistent? Weed suggests that extrascientific values are the cause of the divergence (see section 2.2) and discusses the idea of "wish bias": wish bias is defined as the extent to which an investigator believes *a priori* that an hypothesis is true. To handle this type of problem Weed suggests that a set of guidelines needs to be developed and agreed upon to provide a consistent approach to apply the Hill criteria.

More recently, Colditz (1993), from the Nurse's health study of 89,538 American Women, suggests that moderate alcohol consumption has been shown in both prospective and retrospective studies to be positively associated with breast cancer. The relative risk was ~ 1.3 for 5-14g/day (95% C.I. 1.0-1.6) and 1.6 for 15 g/day (95% C.I. 1.3-2.0). The risk increased when women were divided into high and low risk groups, the low risk group (20,589 women being younger than 55 years, with full term pregnancy before 26 years of age, and no personal history of benign breast disease or maternal or sibling history of breast cancer). Within this group, the relative risk for those consuming 15g alcohol/day was 2.5.

Likewise, a meta-analysis of 50 epidemiological studies suggests a modest positive association between alcohol and breast cancer, "an average of two drinks per day increases risk of breast cancer by about 25%." The relative risk of 26 grams of ethanol relative to nondrinking was 1.24 (95% C.I. 1.15-1.34) (Schatzkin and Longnecker 1994, Longnecker 1994). Furthermore, the data suggest a shallow dose-response relationship between alcohol dose and breast cancer risk. This implies that there is substantial variability in the sensitivity of the population (see section 3.3.2).

Is there any biological plausibility or physical idea to substantiate the mathematical relationship between alcohol and breast cancer observed in epidemiological studies (see note 3.7)? The hypothesis proposed to explain the underlying mechanism of alcohol-linked breast cancer is an increase in estrogen levels observed among women who consume alcohol (Eriksson et al. 1996, Ginsberg et al. 1996, Nasca et al. 1994, Reichman et al. 1991, Gavaler 1993, Colditz 1993). This hypothesis was first discussed in 1973 to describe the difference in incidence rates in different countries (MacMahon 1973). However, the increased incidence was observed only among post-menopausal women. It was then suggested that in addition to endocrine factors, differences in environmental factors that influence endocrine regulation may be etiologically important (DeWaard 1973). Differences in estrogen metabolism among different ethnic groups has been reported and may be related to variability in breast cancer incidence by ethnicity (Taioli et al. 1996).

Animal studies for the linkage between breast cancer and alcohol are in their infancy and only 1 of 6 studies has shown a positive effect (Schatzkin and Longnecker 1994). This situation parallels the development of the lung cancer and smoking relationship, as in both cases the experimental evidence lagged behind the epidemiological observations. In keeping with the metaphor of the plant, only one of the five negative studies is comparable to the positive result. But this study is marred by a high incidence of tumours in both cases and controls such that it would have difficulty detecting a result. In two of the negative studies the alcohol-treated animals had a reduction in body-weight, which Schatzkin and Longnecker (1994) suggest is a determinant of tumour incidence.

The hypothesis that dietary fat is a major risk factor for breast cancer has not been substantiated and there appears to be no association (Colditz 1993, Longnecker 1994). In the Nurse's study, after adjusting for known determinants, the relative risk among women in the highest quintile of total fat intake with women in the lowest quintile was 0.82 (95%, 0.64-1.05). These results are consistent with the National Health and Nutrition examination (Jones et al. 1987, Goodwin and Boyd 1987). What confuses the picture is that ecological and case-control studies support a weak association between dietary fat and breast cancer (Howe 1994). However, prospective studies do support a very weak association at very high levels of dietary fat, as does the Canadian breast cancer screening study (592 cases) RR=1.3 (Willett and Hunter 1994). Is the "chess game" at a stale-mate? We need to guard against the risk of "either/or" positions - the association is weak in both directions, and dietary fat possibly contributes to some breast cancers.

Note that a strong relationship existed between high fat intake and the risk of colon cancer, and that the relationship between dietary fat and breast cancer cannot be generalized to all cancers. Further, obesity is associated with higher levels of estrogen and an increased risk of breast cancer. Importantly, only a small but well-defined percentage of the incidence of breast cancer can be explained by heredity or genetic factors, in particular the presence of the BRAC1 gene.

Why has breast cancer incidence increased in the latter half of the century? Alcohol has been consumed for thousands of years! The causal relation for alcohol is not that strong and cannot explain the increase in the incidence of breast cancer on its own, i.e., there are other causal factors. Schatzkin and Longnecker (1994) argue that most of the studies have controlled for known breast cancer risk factors and other variables, and that the alcohol breast cancer finding has held up. Both "pre and post" menopausal status and exogenous estrogen use have been shown to enhance the alcohol effect, but some studies have found negative associations (Longnecker 1994). The incidence of breast cancer varies five fold around the world. When the offspring of women move from the low incidence areas to the high incidence areas, their breast cancer incidence rates change, becoming closer to those of the new country. Thus there exist unknown environmental factors. The highest rates occur in North America, Israel and temperate South America (Higginson et al. 1992). Interestingly, breast cancer mortality rates dropped by nearly 8% between 1976 and 1986 in Israel (Westin and Richter 1990). The authors suggest that this may be related to the dramatic drop in the use of pesticides in 1978 and subsequent decrease in dietary fat in Israel.

There has been a general increase in the incidence rates for the hormone-sensitive tissues in the United States, alcohol possibly playing a role through the increase in estrogen levels (female breast 24%, ovarian 4%, testicular 41%, prostate 1,265%) (Kavlock et al. 1996). What are the new factors that may potentiate and inhibit the alcohol-estrogen effect? Fruits and vegetables appear to protect weakly against breast cancer (Potter and Steinmetz 1996). None of the recent reviews of environmental endocrine disruptors discuss the possible relationship between alcohol and environmental estrogen chemicals, i.e., xenoestrogens (Kavlock et al. 1996, Ashby et al. 1997, and E.P.A. 1997). Interestingly, none of the breast cancer nutrition or alcohol studies discuss the role of environmental estrogens (Schatzkin and Longnecker 1994, Willett and Hunter 1994, Howe 1994). The dietary fat studies do not discuss the confounding of xenoestrogens in dietary fat or the bio-accumulated levels in human tissues? Perhaps a "chess game" should begin?

In the meantime, what should we tell women about what they can do to prevent breast cancer? Alcohol is thus far the only preventable etiological factor identified for breast cancer. At what point in the weight of evidence do we insist that a health advisory be issued on alcohol products because of the relationship between alcohol and breast cancer? Perhaps at the very minimum a *chess advisory* on the association between alcohol and breast cancer is warranted.

3.7.2 Alcohol and Birth Defects

On November 18, 1989, all alcoholic beverages in the United States displayed the message : "Government Warning: According to the Surgeon General, women should not drink alcoholic beverages during pregnancy because of the risk of birth defects". With respect to the effects of alcohol on the newborn, there is great debate over the idea of a "threshold" dose. One recent review of the epidemiological data suggests a J-shaped relation exists for birth weight; this means that a small amount of alcohol increases birth weight, and then, as the dose of alcohol increases the birth weight decreases (Abel and Hannigan 1995a). Kaskutas (1995) reviews the 1988 hearings to place a warning on alcohol products in the U.S.. During the hearing, Dr. Jones (who was one of the first to diagnose fetal alcohol syndrome in 1973) advocates that there is no safe dose for alcohol and pregnancy (Kaskutas 1995). To provide a perspective of the contingency in the relationship presented, Jones suggests that "a pregnant woman who drinks more than 2 drinks per day has an 11% chance of having a baby with prenatal effects of alcohol." Furthermore, fetal alcohol effects are associated with the entire 9-month duration of pregnancy. The data on low alcohol intake and birth defects still remains inconclusive, and in 1993 "fetal alcohol effect" (not Fetal Alcohol Syndrome, FAS) was proposed to be abandoned as a diagnostic category (Kaskutas 1995). The incidence of FAS is 1.02 cases per 1,000 live births in the U.S.A. (Abel and Hanningan 1995b). Further, alcohol is the only known necessary risk factor for FAS, but it does not appear sufficient. How do we handle this problem?

Smart (1990) discusses the need and the reluctance to place a health advisory on alcohol products in Canada. Health Canada officials are opposed to labels unless the alcohol beverage industry and provincial alcohol commissions voluntarily agree. Smart suggests that health advisories could, at the very least, be of symbolic value in suggesting to alcohol consumers that "public health", the government and the alcohol industry actually care about their health.

Yet, we still do not have health advisories on alcohol products in Canada, not even to warn women who are pregnant (Loney et al. 1994). The only alcohol-related advisory appears in Canadian liquor stores which say: "If you drink and drive then you are a bloody idiot." Even Plato advises especially against drinking alcohol when having children:

> For bride and bridegroom to be in sober senses, seeing they are come to so grave a turning on life's road, must take all care, moreover, those which at any moment may be begetting shall be the work of sober

> parents, for it is quite unknown what night or day shall - under God - give it its being; the growing life must be fashioned with all due order, surely, firmly, in quiet.
>
> But a man in his cups does but sprawl and fumble all ways at once; his body is as crazy as his mind. By consequence the drinker is an awkward, bungling sower of his seed, and it is no wonder he commonly begets shambling, shifty creatures with minds as twisted as their bodies.
>
> Wherefore a man should rather be wary all year long, and all his life through, and more particularly while he is procreating offspring, to forbear, so far as he may, from all actions that prejudices health or is touched with wrong and violence - he cannot but imprint its colour and impress on the minds and bodies of the unborn and become sire to a sorely degenerate brood. (Laws, line 775c)

Plato's advisory concerns the effect of paternal alcohol intake on the generation of offspring. It also stems from a time when no one suspected that there was a genetic contribution from the mother in generating a fetus, i.e., all fetal properties were derived from the males.

As alcohol use is so pervasive, perhaps people, at the very least, should be aware of the detrimental effects through health advisories and the debate through *chess advisories*. It seems that an advisory on alcohol products is long overdue and would be very beneficial to the public, especially for people having children. The experience in the United States suggests that if and when health advisories are placed on alcohol products, they will generate an initial growth of awareness, and then awareness will level off (Hankin et al. 1996a). Research suggests that advisories will have a beneficial effect primarily with people having their first child, but that advisories are not effective for parents who have already had children (Hankin et al. 1996b). For prevention of fetal alcohol syndrome and other alcohol related birth defects, a comprehensive approach needs to be implemented along with advisories to develop understanding in all members of society, as the risks are related to socioeconomic status, culture, belief structure, nutritional status and variety of drinking patterns (May 1995). Kaskutas (1995) points out that we need to be aware of the risk of stigmatizing women who drink small amounts of alcohol when pregnant.

3.8 Problematic Health Risks: Chemical Contaminants in Food

The communication of health risks is complicated when the toxic chemicals of interest are mixed with food, through bio-accumulation in the food chain, like toxaphene, and other "contaminants" in fish and wildlife in Canada (see section 1.3). For chemical contaminants in food the risks are most definitely in the "chess game" stage (see Introduction). Fleming (1965) introduces the concepts of "environmental management" and the "risk culture" to public health with respect to these problems, saying: "We must recognize that we no longer live in a world that is 'safe or unsafe' but in one of compromise and calculated risk" (Fleming 1965, p. 5) (see section 2.2). In northern Canada, evidence has been mounting that many traditional sources of food have high levels of environmental contaminants, many of which have migrated long distances from the southern industrial areas where they are manufactured and used (see section 1.3).

In these cases, for example in Northern Canada, the benefits of the food must be weighed against the potential harms of the chemical contaminants (Wein 1995). The risks of communicating about contaminants must be balanced against the risks of turning people away from nutritious food. Wein (1994) also points out that market food items, like fruits and vegetables, are not a viable option for northern communities because they are very expensive in the north. Ironically, the northern people do not gain any benefit from the use of pesticides. Further, this increases the importance of country food in the northern diet. Thus, in many cases, the risks are not limited to contaminants, but include risks to livelihood, people's way of life, their very way of being (Wein et al. 1996). Moreover, fish in southern parts of Canada have similar contaminants, so a "contaminant free fish" cannot be imported to the north.

The communication can no longer be a simple numerical calculation of food safety, where fostering autonomy means understanding the numbers, or understanding a barricade. These cases require time and patience to develop understanding, such that the communication does not produce more harm than good by scaring people rather than enlightening them. We need a communication process to achieve this balance.

The approach for public health risk communication developed in section 3.4 has limitations because generally we are exposed to complex mixtures of chemicals, as suggested in section 3.2.3. Analysis of a single chemical may provide information on apparent thresholds, dose-response relationships, and apparent health effects. However, in the presence of other chemicals, these may be substantially changed.

Consider the health advisories that have developed for contaminants in fish in Canada, in particular the chemical toxaphene. Very little is known about the chemistry, environmental behaviour, and toxicology of toxaphene (Bidleman and Muir 1993). Toxaphene is a complex mixture of some 200 pesticides (also known as polychlorocamphenes and boranes) which are of concern because they readily bio-accumulate in fish (ATSDR 1994). They are not readily degraded in the environment nor in the fish. Toxaphene has been spread all over Canada as a result of its abundant use, approximately 1,330,000 metric tons world wide. Toxaphene was used heavily, replacing 2,2[4-chlorphenyl]-1,1,1-trichlorethane (DDT) when it was banned in the early 1970s, and was banned itself in the U.S. in 1982. The analytical techniques were developed for toxaphene only in the mid 1980s. However, as the next section demonstrates, the key concerns expressed now for toxaphene and other contaminants were known very early in the debate from experimental results on pesticides and sampling of human exposure.

3.8.1 Brief History of Pesticide Communication in the *Canadian Journal of Public Health*

In 1946, it is reported that there are no proven cases of 2,2[4-chlorphenyl]-1,1,1-trichlorethane (DDT) toxicity in humans and that it is quite safe for use if ordinary precautions are taken, like avoiding skin contact, and wearing rubber gloves and respirators (Baillie 1946). Heath (1947) comments that no adverse effects on wildlife or birds have been observed from DDT spraying, but cautions that there is no conclusive evidence and that DDT is indiscriminate in action on all forms of insects.

This message was changed in 1950, when discussion of toxpahene, methoxychlor, chlordane and heptachlor chlorinated organics were introduced into the *Canadian Journal of Public Health* (see section 1.3) (Kay 1950). Kay says DDT and its analogs are "stored in considerable quantities in animal fat and excreted via the mammary route" (Kay 1950, p. 376). Further, chlordane, toxaphene, and methoxychlor are rated as having higher toxicity than DDT. Bioaccumulation is the major problem for these contaminants.

Case reports of three field deaths from acute exposure, "one to one" causal relationships, are discussed. Suppression of the enzyme cholinesterase was put forward as a possible mechanism of human toxicity. Kay describes the wide-spread introduction of these new pesticides as a challenging new problem that exists at the level of smaller organizations and individual farmers because of the inadequate safety precautions and the desire to avoid investing the large capital for safety equipment. This exemplifies the need for fostering autonomy in cases of acute risks (see section 3.4.2).

In 1952, Kay increases the list of chlorinated pesticides in use to include aldrin and dieldrin and suggests that because demand for the products is high, toxicity testing time-consuming and costly, full investigation of all aspects relating to human toxicity has not been possible prior to licensing. Kay (1952) discusses the limitations in extrapolating experimental toxicities of only the active ingredient or pure compounds to humans because of the presence of associated compounds in commercial mixtures. Their experiments found synergistic effects with commercial formulations.

Kay (1952) also discusses the decrease in cholinesterase levels in workers from the application of parathion in comparison to a control group. Concern with the pesticides is raised because they are stored in the fat and other tissues and are characterized as having chronic or delayed toxic effects.

Brown (1953) discusses the resistance of some insects to DDT and other compounds in different parts of the world. He suggests this is not as large a problem for Canada because the generation turnover is not as fast. Brown suggests that "the future of insect control by chemicals in Canada is bright indeed since the country can afford it, has the ability to perform it, and has comparatively slow-breeding and insecticide-susceptible species of insects" (Brown 1953, p. 8). Brown does not discuss any possible human or environmental health effects.

Allmark (1954) outlines the information needs to determine the quantity of pesticides which may cause harm, to establish tolerances and regulations, much along the lines of the "risk assessment" framework presented in section 3.2. In particular, information on the pharmacodynamics, acute toxicity, subacute toxicity, chronic toxicity, external effects and special studies like reproduction are presented. The need to study multiple species is stressed to understand *uncertainty* in the particular end-points.

Kay (1956) comments that the ill-effects from acute exposure to chlorinated hydrocarbon pesticides are non-specific, "one to many", and hence the role of these chemicals as etiological agents in human disease is not readily recognized. The acute and chronic effects cannot be stated in workers because reporting is fragmentary and the potential health effects in the general population have not been evaluated. Kay cautions that pesticides represent a significant public health problem because of their free use and the tremendous quantities being consumed.

Williams (1962) speculates that about 40% of people using the pesticide (based on a survey) would actually read the instructions for safe use and precautions in handling insecticides. Williams discusses the difficulty in reaching all farmers and advocates that public health officers should try to give short talks on chemical safety at agricultural meetings, and emphasizes talking to farmers' wives. Williams advocates collecting blood cholinesterase levels in people to determine the exposure levels. Note that the presence of DDT in human adipose tissue (4.9 ppm DDT) is first documented in Canada in 1961 (Read and McKinley 1961).

Pickett (1963) comments on Rachael Carson's (1962) *Silent Spring,* which dealt with the use of pesticides and the growth in the use of pesticides in the U.S.A. and Canada. He argues that chlorinated hydrocarbons and organic phosphorous compounds are extremely toxic nerve poisons that affect practically all classes of animals and that considerable harm has been done to wildlife, fish and birds. Pickett says that we have rushed into the widespread use of pesticides too rapidly and cautions people to treat them as potent lethal weapons. Pickett comments that both sides, opponents and proponents, exaggerate the ill effects or the safety out of proportion to reality.

Mastromatteo (1965) comments on the widespread contamination of chlorinated hydrocarbons in soil, water, natural food chains and people. The storage in wildlife and humans results from bio-accumulation of minute portions in the body fat. Mastomatteo says that at this time there is no evidence of harm, but cautions that "they have only been with us for two decades."

Kadis and Jonasson (1965) discuss the lack of methods to evaluate the persistence of chlorinated insecticides in human and animal blood. In their experiments DDT and dieldrin persisted in animal blood for 42 days. Kadis et al. (1970) published human tissue levels from the general population of Alberta for various insecticides present in decreasing concentration: adipose, liver, kidney, gonad and brain. The total level of DDT is approximately 4.4 parts per million, and is similar to that observed by Read and McKinley (1961). The researchers note that residues of other common chlorinated insecticides, such as eldrin, chlordane, and toxaphene were not detected. Analytical techniques to measure toxaphene were not developed until the mid-1980s and therefore it was not considered as a human contaminant.

In 1971, organochlorine pesticides present in maternal blood and placenta from normal births were compared. They were found to have concentrated and stored in the placenta (McLeod et al. 1971). The metabolites of DDT, DDE, were found in significantly detectable concentrations in every sample (52 samples), the average being 1.4 parts per million.

Ritcey et al. (1972) report the presence of organochlorine residues in human breast milk from various parts of Canada. The results from these studies suggest that the levels for all pesticides in human breast milk are significantly greater than for cow milk (evaporated milk and prepared baby formula). Thus, newborns would be exposed to greater levels of pesticides from breastfeeding.

Holderinet et al. (1977) published levels of PCBs (1.0 ppm), dieldrin (0.04 ppm), and DDT (1.39 mg/kg) in human adipose tissue and human breast milk over the period of 1969 to 1974. The levels remain essentially constant over this range. Frank et al. (1988) continue the study and report that neither DDT nor PCB residues declined appreciably in human whole milk from 1976 to 1985. Toxaphene is not as yet mentioned in the literature.

Labonte (1989) presents a paper called "Pesticides and Healthy Public Policy" in which he discusses the use of pesticides in Canada. Labonte notes an increase in pesticide use in Ontario of 59% from 1973 to 1983, with a corresponding 56% increase in the quantity of pesticides used per hectare of cropland, and that global pesticide use increased 1,300% between 1945 and 1980. Toxaphene is not mentioned in the paper. Labonte mentions "right to know" as an avenue to decrease pesticide use.

The risks associated with pesticides were discussed throughout their use in the *Canadian Journal of Public Health*. Basic concerns were identified very early (1950), and residual levels in humans in Canada were documented, beginning in 1960. Yet this had little effect on pesticide application. Toxaphene is mentioned when the compound is first introduced by Kay (1950), who suggests that the complex is more toxic than DDT. Still, toxaphene was used extensively after DDT was banned in the early 1970's, until being banned itself in 1982 by the U.S.A. (Saleh 1991). What is the evidence to support this move? What weight did considerations of public or environmental health have on this decision? Who is public health?

Very little is reported in the *Canadian Journal of Public Health* on the use of toxaphene after Kay, possibly related to the inability to measure the toxaphene residues in samples. The exposure assessment of toxaphene is a great uncertainty, but we knew that we were releasing copious amounts to the environment. Note that the major concerns from pesticides, storage in the adipose tissue and excretion in breast milk, were identified in 1950. The potential consequences were known. A *chess advisory* could have been released in 1950 stating the concerns and problems that risk communication faces now in 1998. Perhaps raising and discussing these concerns publicly in 1950 may have promoted research into alternative methods of boosting agriculture production.

3.8.2 Health Risk Communication for Toxaphene in Fish

3.8.2.1 Calculation of a Safe Dose of Toxaphene

As mentioned previously, toxaphene is a major contaminant in fish across Canada and poses particular problems in northern Canada (see section 1.3). Toxaphene alone causes immediate death ("one to one" causal relationship) in humans if ~2,000 - 7,000 milligrams are ingested (ATSDR 1994). Concentrations in fish are generally well below the levels that can contribute a dose sufficient to cause this "one to one" causal relationship. Lethal exposures have occurred in field workers (Kay 1950).

The safety or uncertainty factor approach was used to determine the safe dose (minimal risk level, MRL) for toxaphene by the Agency for Toxic Substances and Disease Registry (ATSDR 1994). For acute toxicological effects, three safety factors were used to determine the minimal risk level (MRL) or safe dose: 10 for use of lowest observed adverse effect, 10 for *uncertainty*, the extrapolation from animals to humans, and 10 for human *variability* (ATSDR 1994) (see section 3.3.2). The MRL calculated by ATSDR is 0.005 mg toxaphene/kg body weight/dy for acute exposure and 0.001 mg toxaphene/kg body wt/dy for intermediate exposure (no MRL was derived for chronic exposure).

The background exposure of toxaphene varies, but mean values of 0.011 mg/g in lake trout fish lipid and 0.007 mg/g in whitefish lipid have been reported from Lake Superior (Swackhamer and Hites 1988). Based on these values, how much trout fish meat would a 100 kg person need to eat to reach the MRL value? (Note, Health Canada uses a 60 kg person and I have used 100 kg, for ease of calculation.)

We can calculate the amount of fish that can be consumed in three steps.

1. The values of toxaphene reported are for fish lipid concentrations not for the fish meat. Therefore we need a conversion factor to determine the flesh concentrations based on % lipid in flesh. As a rough guide, assuming 10 % lipid in flesh, the flesh would contain 1/10 of the amount of toxaphene reported for lipid, i.e. the mean value in flesh would be 0.011 mg toxaphene/g trout lipid x 1/10 = 0.0011 mg toxaphene/g flesh of trout.

2. The ASTDR standard is 0.005 mg toxaphene/kg body weight for acute exposure. Assuming we weigh 100 kg, this means we can eat up to 0.5 mg toxaphene/day (0.005 mg/kg x 100 kg = 0.5 mg toxaphene/day) without exceeding the ASTDR consumption standard for acute exposures.

3. From 1, the trout flesh has 0.0011 mg toxaphene/g flesh. From 2, we can eat 0.5 mg toxaphene/day. Therefore we can eat up to 500 g of trout fish flesh each day (0.5 mg toxaphene/day/0.0011 mg toxaphene/g flesh trout = 500 g trout fish meat/day).

Chan et al. (1997) calculated that over 50% of residents in Canada's North exceed the guideline value in their diets, and the high end consumers exceed the guideline by 6 times. A health advisory may be released based on these data and the approach described for the release of advisories in section 3.4 can be applied to this situation. After all, the prompt to release a health advisory is when consumption of a toxicant in fish exceeds the guideline value.

3.8.2.2 Complex Mixtures: Problems of Actual Exposure from Eating Fish

The problem with the approach becomes apparent when we consider the complete exposure scenario. A person eating fish will not be exposed just to toxaphene because fish contain many chemical contaminants. Canadian fish analyses show at least 18 different pesticides, including significant amounts of chlordane, dieldrin, trace levels of endosulfan and other chemicals, like PCBs, dioxins and furans (Swackhamer and Hites 1988). Chan et al. (1997) suggest that levels of mercury, toxaphene, and chlordane exceed the guideline values, and PCBs are present just below the guideline value. Notice that toxaphene and chlordane are the toxicants Kay discusses in 1950.

Under the "one chemical at a time" approach, health advisories would be issued for mercury (exposure - 13 μg/kg/wk vs guide - 5 μg/kg/wk provisional standard), toxaphene (1.2 μg/kg/dy vs 0.2 μg/kg/dy Health Canada - tolerable daily intake) and chlordane (0.44 μg/kg/dy vs 0.05 μg/kg/dy tolerable daily intake), as all three chemical exposures exceed the guideline value (Chan et al. 1997). Note that the Health Canada guideline value for toxaphene is approximately 10 times lower than the ATSDR (1994) MRLs.

If we consider Ashford's comments (see section 3.4.2), as the uncertainty in the causal relations increase, the ethical principles change; as the uncertainty increases, we need a process to decide both the risk assessment and risk management options. How can we differentiate the toxicants?

Of the four contaminants, the scientific evidence is strongest for mercury. Actual cases of non-lethal "one to one" causal relationships have been observed in humans from fish consumption, in particular, neurological effects in the developing fetus, but at concentrations much higher than in the fish (WHO 1990). Kostasky and Foran (1996) discuss the need to revise downward the WHO LOAEL for mercury of > 200 parts per billion (ppb) blood mercury equivalent, as the historic fish consumption studies do not support this value. However, the main problem with fish studies is the very small number of people involved in the studies. Indeed, in the Canadian experience the exposure population is small (0-19 ppb methyl-Hg: 29,724 people; 20-99 ppb: 8,239 people; 100-199: 541 people; >200 ppb: 67 people) (ppb mean parts per billion) (Wheatley and Paradis 1996). Of the people with >100 ppb blood methyl-mercury, only 99 of 608 (1 in 6) people have been examined in detail, 11 people with neurological signs attributable to methylmercury, but definitive diagnosis was not possible. In the Canadian study, the actual minimum risk detectable in the range around the apparent threshold dose for methyl mercury is 1 in 100. Which risks can we see at this detection level? What can we actually say about causation?

Health Canada has experience in releasing a health advisory for mercury, having told natives to stop eating fish with mercury with up to 24 µg Hg/g in Grassy Narrows, Ontario, in comparison to 13 µg Hg/g in the North. Unfortunately, this resulted in severe side-effects: socio-cultural disruption, change in lifestyle, socio-economic damage and change of diet leading to diabetes, obesity and loss of fitness, violence in the community, and alcoholism and suicide (Shkilnyk 1985, Wheatley and Paradis 1996, Wheatley 1996). This experience demonstrates the seriousness of the risk management ethical dilemma - finding the balance between the assumed risk from contaminants with the known risk of advising change in lifestyle (Wheatley and Paradis 1996). Further, the risks associated with the contaminants are much broader than the direct health effects associated with the contaminants. In contrast to mercury, the data for toxaphene and chlordane are much more uncertain because actual cases of human harm at these environmental exposure levels have not been demonstrated. Balancing the risks is much more complex for these contaminants.

The problem develops when considering the exposure as a whole, the complex of chemicals in the fish. How can we discuss the risks to mercury independent of the other chemical contaminants? Consider toxaphene: the "one to one" approach to risk does not consider the effect of all the chemicals and, indeed, a safety factor for the effect of complex mixtures was not considered for toxaphene. This has not been discussed as a potential problem. Further, ATSDR (1994) suggests that there are no animal experiments examining the effects of exposures to complex mixtures. There are no data with respect to the complex mixture of mercury, chlordane, PCBs, dioxin and the other contaminants present in the Canadian fish.

The approach used by ATSDR (1994) is the standard approach based on the most sensitive end-point. However, the approach did not consider the effects of complex mixtures and did not discuss estrogenic effects for toxaphene. The estrogenic activity of environmental chemicals suggests they are causal factors in abnormal sexual development, increased risk for breast cancer, and decrease in human semen quality. A review of the research needs has been presented by Kavlock et al. (1996) and critiqued by Ashby et al. (1997). Ashby et al. (1997) provides a comparative analysis of the 56 chemical carcinogens to humans and the chemical endocrine toxicities in humans using Hill's framework that illustrates our *state of ignorance* (Table 3.3).

The potency of each chemical pesticide alone is sufficiently low that reproductive effects would not be identified in single chemical studies, and experiments for this effect suggest that it is not a problem. The ATSDR (1994) concludes that there is no need to investigate reproductive health effects. Toxaphene has been classified as a probable hepatocarcinogen (and possibly affecting the thyroid gland) from animal experiments, but no conclusive evidence is available to link cancer in humans with toxaphene. The slope factor for cancer (the q1*, see section 3.3.2 above) was calculated as 1.1 (mg/kg/day)-1 (ATSDR 1994).

The point is that the theory of toxaphene health effects is indeterminate; complex mixtures and the estrogenic response were not part of the hazard identification and dose-response risk. How do we apply the minimal risk level? The MRL applies only to toxaphene in isolation. Perhaps the effect is more sensitive considering the complex exposure? An estimate of the risk was made, a probability of health effects articulated, but the probability is made *under ignorance* not under uncertainty.

3.8.2.3 The Recent Risk Game: The Science of Synergistic and Additive Relationships

The "risk game" has undergone some interesting moves with respect to complex mixtures and the possibility of synergistic effects for estrogenic chemical contaminants. The recent "chess moves" provide an excellent case to discuss the progression of scientific knowledge, the relation between theory and hypothesis, and science as a somewhat "open" community. A recent experimental process at first demonstrated that the estrogenic potency of the pesticides toxaphene, chlordane, dieldrin, and endosulfan is enhanced by 1,000 times when any two of the chemicals are combined together; there are synergistic effects (Arnold et al. 1996). This result is very significant because the safety factors (1,000) applied to toxaphene equal the increase in potency for the estrogenic effect. Soto et al. (1994) report similar findings with toxaphene, dieldrin, and endosulfan in an estrogen sensitive bioassay that measures the proliferation effect on human estrogen-sensitive cells. Each chemical alone is weakly estrogenic in the assay, as ASTDR suggests. Nonetheless, a complex mixture of 10 chemicals, each at a10-fold lower dose, produced estrogenic effects in the bioassay.

However, the "synergistic" results of the experiment of Arnold et al. (1996), were challenged (Ramamoorthy et. a. 1997). These researchers could not reproduce the synergistic findings. Ramamoorthy et al. (1997) present an experimental system that demonstrates additivity of the weak estrogenic chemicals. However, McLachlan et al. (1997) (same group as Arnold above) argue that the two experiments are not the same in important respects and thus are not really comparable. This can be understood in terms of Socrates' "metaphor of the plant" (see section 3.3.2 and note 9). Briefly, McLachlan says that:

> 1. Ramamoorthy used MCF-7 breast cancer cells that contain 20 to 30 thousand estrogen receptors (ER) with an additional 4 to 5 μg of hER cDNA. In comparison, the Arnold result is a yeast-based assay with 500 to 1,000 ER per cell.
>
> 2. Our earlier work showed synergistic responses to weakly estrogenic chemicals in turtles that were treated early in development. Ramamoorthy's study was performed in the uterus of female mice that had already undergone sexual differentiation. Our contention has been that developmentally exposed animals are more likely to demonstrate synergistic responses to estrogenic chemicals.
>
> 3. Ramamoorthy suggests that dieldrin and toxaphene, at the lowest doses used, appear to have induced the progesterone receptor, an estrogen specific biomarker in mice, in a synergistic manner.
>
> 4. This suggests that some estrogen-dependent phenomena are better markers than others for revealing synergistic responses.

Notice that McLachlan points out important distinctions in the experimental conditions, namely, that the environmental conditions of the experiments differ in the two experiments. They suggest that these differences account for or produce the different experimental results.

McLachlan suggests that at the low doses used in the Ramamoorthy experiment, a synergistic response was observed. This means the additivity effect is not consistent across all experimental conditions and that it is contingent on the dose of chemicals. At low doses of the chemicals, the additivity relationship "breaks down" and a synergistic response emerges, not an antagonistic response. The characteristic that suggests a causal relationship is the existence of a regular relationship between a particular act and outcome which holds in a wide range of conditions with predictable reproducibility (see section 3.3.1)(Bohm 1957).

Both the additive and synergistic results appear to exist within a range of experimental conditions and, outside this range, the contingencies of the relationships emerge. Scientific theory develops by exploring the borders of causal relationships, researching the contingencies of causal relationships. McLachlan's point 3 suggests that we cannot extrapolate quantitatively to lower doses without considering the qualitative changes: the new relationships that emerge between these chemicals and the particular cell processes. This is the problem discussed in section 3.5 above.

A second and more important development in the risk game is that McLachlan (1997) has recently withdrawn the Arnold et al. (1996) study results because their own experimental results could not be reproduced. Their system is down. The hypothesis that the estrogenic chemicals are synergistic cannot be substantiated in experiments. The hypothesis remains an hypothesis.

What is the theory of the interaction of xenoestrogenic chemicals? Based on the Ramamoorthy et al. (1997) experimental system, we can argue that the interaction is additive. However, other scientific studies suggest synergism, for example Soto et al. (1994). Is the result dependent on the experimental system? What meaning do these words "sysnergism" and "additive" have outside the context of the specific experiment? Is there an experiment that will tell us "once and for all"? How do we bring together the observations from different experiments into a coherent view? Ashby et al. (1997) note the intrinsic difficulty of attempting to simultaneously study all aspects of endocrine disruption in one experimental system. After Socrates, the more plants we grow in a variety of environments, the more complete our view of objectivity will become.

More problematically, how do we apply these results to the conditions of exposure that people face from consuming fish? People consume xenoestrogenic chemicals in fish, alcohol and from many other sources. The theory does not say that there are no interactions between the estrogenic chemicals or that the chemicals act antagonistically. This episode shows that with scientific experimental systems we look for ways to demonstrate the possibilities that may exist: synergism, antagonism, additivity. We may form an hypothesis based on Ramamoorthy et al. (1997) and McLachlan's exchange that under some experimental conditions synergistic responses will emerge between these chemicals.

We can see that scientific knowledge is contingent on the experimental conditions, the environment of the particular experiment (see section 3.3.2). How do we bring together contingent particular knowledge from different assays with the rest of the uncertain scientific knowledge for this situation (consider our state of ignorance, Ashby's Table 3.3)? This is where the question of incommensurabilty enters risk management most vividly. How do these recent movements in the "risk game" affect our overall view - the theory of estrogenic chemicals in the environment? These are two very unique and specific assays - how should our impressions rise and fall with these perturbations?

If we consider this episode as part of the overall pesticide "risk game", how do you win the game - by developing scientific experiments that support your side? Do "risk researchers" specifically attempt to produce and publish results in accordance with the position of their side? And as Leiss (1995) suggests, do we direct people's attention to only those findings that support our side (see section 3.1.2)? How will "risk managers" run with this latest development in the risk game? As "risk managers" should we take our bets off McLachlan's group, withdraw support because their experimental system is not operating with reproducibilty? Should we hold as contingent all the research from McLachlan's group? Should we commend McLachlan for being so honest in the environmental risk game? Do these questions require extrascientific values?

If we place this risk game in the context of the whole public and environmental health game, like the tobacco and alcohol games, are we doing "risk science" simply to ascribe the limits of liability, and perhaps this is why it is called "risk science"? Indeed, the consequences were predicted in 1950, but this is not enough to cause prevention; no, we need the cold bodies with the liable molecules still attached and only then perhaps will "the facts speak for themselves" and cause reflection.

3.8.3 Contaminants in Breast Milk

The chemical contaminants are not limited to fish given that these chemical contaminants have been documented in human breast milk as would be expected based on Kay's experiments in 1950. Rogan (1996) notes that some member of the DDT family has been detected in virtually every breast sample for the last 40 years, and more recently, hexachlorobenzene, dieldrin, heptachlor, chlordane, dioxins, and PCBs. Although breast milk if regulated like infant formula would commonly violate action levels for poisons and could not be sold, Rogan advocates breast milk over infant formula. Breast milk provides the child with the best source of nutrition for their needs. Knowledge of chemical contaminants in breast milk means that a mother knowingly exposes her child through breastfeeding. Therefore, the communication of chemicals in breast milk is an extremely sensitive issue, perhaps more so than contaminants in food more generally. (Note that there is a great number of papers discussing breast feeding in the *Canadian Journal of Public Health*, not specifically related to contaminants, that I do not review here.)

For polychlorinated biphenyl (PCB) mixtures, the nursing infant is exposed to a roughly 50-fold higher amount than adults when corrected for weight (1.5-27 μg/kg vs. 15-55 μg/kg). Frank and Newman (1993) argue, without providing the risk numbers to compare one population with another, that breast feeding is safe and that low-level exposure to PCBs in breast milk does not cause harm. They advocate strongly that the positive effects of breast milk outweigh the low risks from low-level exposure to PCBs.

The main source of data is from Jacobson and Jacobson's study of the neurological effects observed from exposure to low levels of PCBs in Great Lakes fish, from eating 2 to 3 meals of fish per month, for six years prior to birth (Seegal 1996, Jacobson and Jacobson 1996a,b). The neurological results are more strongly associated with in utero exposure (~ 3 ng/ml fetal cord blood) than through breast milk.

A recent experiment attempted to determine if changes in diet could lower the levels of contaminants, dioxins and PCBs, in the breast milk (Koppe 1995). Two diets were tried: (1) low fat/high carbohydrate/low-dioxin, (20% of energy intake derived from fat) and (2) high fat/low carbohydrate/low-dioxin. The low-dioxin diet was obtained by consuming pork, but this is not an option for the northern people. No significant influence on the dioxin concentrations in breast milk could be found. The study suggests that ~86% of dioxins in breast milk are derived from stored reserves.

As might have been anticipated from Kay, the problem is the gradual accumulation of contaminants in the body, the increase in the endogenous background concentration that accumulates from continuous low-level exposures. The researchers conclude that long-term reductions in dietary consumption of contaminants are required to reduce the concentrations found in breast milk. Note that this is merely one study and does not provide evidence of health effects from contaminants on the newborn. The study says only that the newborn will be exposed to a steady level of contaminants from breast milk. This area needs to be investigated more thoroughly. However, what do the northern people do in the meantime? What do the southern people do meanwhile? How do we communicate this problem?

The atmospheric transport of chemical contaminants implies that the north will be continuously exposed to contaminants into the future (see section 1.3). The toxaphene contamination of the country food is the result of past activities, from ~10 to 40 years ago. What new contaminants are being transported to the north now that may potentially bio-accumulate in the food chain? This is a question of distributive justice. How do we approach this ethical dilemma? As we move from the "one to one" relation to the "many to many" relation, when do we say we are causing harm?

Frank and Newman (1993) point out the importance of being aware of the risk of harming women in the communication process. We need sensitive communication methods. The experience in communicating mercury contamination in fish in Grassy Narrows, advising against fish consumption, demonstrates that communication potentially results in severe side-effects. But still, a mother must face the fact that she may harm her baby, knowing her specific breast milk has not been measured, and that exposing her child inadvertently in utero is possibly related to neurological effects. This is especially important for women in northern Canada, who are exposed to higher levels of contaminants through country food and eat more fish than the mothers in the studies mentioned previously, i.e., much more than 2 to 3 meals a month.

However, Bursztajn et al. (1990) argue that we should not simply treat people as experimental objects, trying scientifically to find definitive causes, trying to decrease the uncertainty in causal theories, to win the risk game through searching for safe doses. Bursztajn et al. (1990) suggest that before beginning scientific analysis we should determine what we are capable of detecting. As mentioned with mercury, if there are only 100 people in a group, this means that we can detect only a minimum of a 1 in 100 causal effect. Which effects can we readily "see" with proposed scientific investigations? How accurate an endogenous background concentration of contaminants is required under these circumstances? The endogenous concentrations have been documented since 1961 and have remained relatively constant (see section 3.8.1). Are we really accomplishing anything by measuring concentrations now?

As Usher et al. (1995) note, the risk research community is economically flourishing from the exposure of the population to contaminants (see section 1.3). But what can really be done about this problem? Neither the fish, nor the air which exposes both the fish and people, can be remediated, and it appears that people's endogenous concentrations cannot be readily reduced. What is the point of these scientific studies - measuring contaminants in people?

As experience suggests, we need a risk communication process that is sensitive enough to allow mothers, and people in general, to say, "I just want to forget about the risks for now, exercise my 'right NOT to know' right now, place the risks in the *nondeliberative* realm" (see section 4.4). Relational ethics provides a framework to develop a risk communication process with a natural tension between the "right to know" and the right to say, "I've heard enough for now!"

3.9 Conclusion

The basic framework for public health risk communication, the relationship between ethical approaches and the application of the principles, and causal relationships, has been presented. Generally, the uncertainty of the ethical principles increases as we move from "one to one" causal relationships to "many to many" causal relationships. As the uncertainty in the risk increases, the communication process requires a contextual approach to determine the risk, the communication needs and the ability to mitigate the risks. I argue that the roots of ethical public health activity should be grounded in Socrates' activity of fostering autonomy. The relational ethics framework provides an approach that grounds risk communication in the relationship between the community and public health practitioners, where public health providers help people "think for themselves".

Fostering autonomy is a needed principle in public health practice. The Inuit made it clear that they did not want to be given the scientific data to assess food safety themselves, they did not want to stand alone, they want their autonomy fostered. Neither do they want paternalistic advisories at the lakes that say "eat only one fish liver a week" (Usher et al. 1995). This sentiment can probably be extended to the public in general. There is a need to develop a concept of fostering autonomy for public health practice.

Public health practitioners must actually become involved with communities, over a significant amount of time, such that they can begin to understand the perspective of the community, to provide respectful risk communication that meets the needs of the community. Further, the process of risk communication requires the patience to help the members of the community develop a risk perspective.

This approach can be found in the activity of Socrates, the public benefactor. The dialogues of Plato, and the Socratic writing of Xenophon, provide us with a renewed root to ground public health activity. In the next chapter I will develop the concept of fostering autonomy based in Socrates' activity. I will present Socrates as a healthcare provider and risk communicator. "Socrates as public benefactor" will be developed through the *Laches* dialogue and the "Allegory of the Cave" from the *Republic VII* dialogue. In the "Allegory of the Cave" people are depicted as being chained to a cave wall, unwittingly observing mere shadows reflected on the wall of the cave as everyday sense objects. The Socratic influence is expressed as a responsibility to live in the community with people, down in the cave, helping them to become aware of the shadows and the real objects, and to escape the depths of the cave altogether through dialogue, developing each individual's reasoning skills by fostering their ability to think for themselves. This approach supports Morgan and Lave's (1990) claim that public health providers have a responsibility to understand and know the effect of health risk communication on those who hear the message.

Thus, risk communication must take place by actually living in the community in order to understand the community, and to understand the effects of risk communication as part of the community. The effects of our directed actions are the means to risk communication.

Notes

3.1 (section 3.1.1) The scientific activity of "public health" arguably originates with Socrates and Hippocrates. A general argument of the thesis is that Hippocrates follows Socrates' scientific practice. With respect to public health, in the essay *Airs, Waters and Places*, attributed to Hippocrates of Cos, the first 11 sections discuss the role of environmental factors with respect to health. In the *Epidemics* essay Hippocrates discusses case reports associated with environmental conditions. The concept of health in relation to the environment is similar to Socrates' "metaphor of the plant" (see section 3.3.2). Hippocrates is claimed to have discussed health effects from metal poisoning in the mining industry with some basic principles of toxicology (Klaassen et al. 1986). However, I have not been able to locate these writings so far.

Farrington (1980) claims that the effect of industrial processes had been observed in antiquity, when slaves and condemned criminals were sent to the quarries and the mines, but that it was neglected. Farrington says:

> The Hippocratic doctors had written of the effect of the environment on health, but they considered only the natural environment. It remained for the modern world to discover that the most important aspect of the environment for the worker is the job. Paracelsus (1490-1541) is the first to draw attention to this gap in the medical theory of antiquity. Discussing the dreadful effects of their trades in the miners and metal-workers, the asthmas, consumptions, and vomitings, he comments: "There is absolutely nothing about the diseases to be found in the ancient medical tradition, whence, up to the present day, no remedy is known". These conclusions were later extended to almost all known occupations by the great Ramazzini (1633-1714), whose classic work De Morbis Artificum rivals the merits and exceeds the humanity of the greatest works of antiquity. (Farrington 1980, p. 310)

3.2 (section 3.2) Socrates and Hippocrates share a similar disposition in one respect to the pre-Socratic, Ionian Science tradition. Cornford (1981) says that the Ionians developed theories of the origin of the world and man with presumptions of great certainty, and they used these to discuss the Nature of human beings. They offered no experimental proof of their theories. Cornford says that Socrates felt that the Ionians neglected matters of human concern, they offered us no approaches on the right way to live, and that their theories on the Nature of reality actually neglected these vital questions (see Phaedo lines 96-99). Like the metaphor of the "Allegory of the Cave", Socrates says: "I wonder that they cannot distinguish the cause from the condition, which the many, feeling about in the dark, are always mistaking and misnaming; and thus one man makes a vortex all round and steadies the earth by the heaven; another gives the air as support to the earth, which is sort of a bad trough." The Ionians postulated about things which could not be known while assuming certain knowledge of these things. Indeed, Socrates' concern is that there is no method to tell the difference between competing theories, the one or the many (see Xenophon, Memoirs 1.1.11).

Cornford argues that Hippocrates protested the use of these theories as a basis of medicine. Hippocrates says of some who have written about nature, "they discuss the origins of man and of what he was created. It is my opinion that all which has been written by doctors or Sophists on Nature has more to do with painting than medicine. I do not believe that any clear knowledge of Nature can be obtained from any source other than a study of medicine and then only through a thorough mastery of this science. It is my intention to discuss what man is and how he exists" (Chadwick and Mann 1950, p. 25). Socrates and Hippocrates share a pragmatic approach to solving the problems of their day, a concern with their existence.

Interestingly, Bursztajn et al. (1990) have a similar concern related to ethics except that now we are locked in a gaze toward the future with our ideas of what it means to be scientific (Putman, the preface to Burztajn et al. 1990). Putman says: "Doctors should not see themselves on the model of an astronomer who can predict the position of the constellations millions of years in the future using astronomical data and physical laws. Instead, they should see themselves as engaged in gambling - but gambling with moral responsibility because they have the welfare of a fellow human being in their hands and without pretending that there is some knowledge that can be obtained without a gamble which will always point to an objectively correct decision" (Putman p. xi).

3.3 (section 3.2) The *Phaedo* was written in the middle of Plato's writing career. The dialogue is believed to contain a mixture of Socrates' and Plato's thought. The main argument of the dialogue is about the possibilities at death (see Introduction).

Socrates presents two lines of evidence to support his belief in the afterlife. First, Socrates claims to have had a divine or supernatural experience and this is supported in the *Apology*. Socrates says: "It began in my early childhood - a sort of voice which comes to me, and when it comes it always dissuades me from what I am proposing to do, and never urges me on" (Apology line 31d). The "voice" refuted Socrates and thus advanced his proposals. In his trial, Socrates also points to the pragmatic effect the experience has had on his life, that he lived all his life as a public benefactor in poverty, as proof of the divine encounter.

In the *Phaedo*, Socrates' dreams come rushing on, the voice pushing him forward not refuting him (Phaedo line 60c, see section 4.4). He places emphasis on the creation of ideas and his ideas are not refuted in the *Phaedo* dialogue by the voice. Socrates' basic position is that these creative ideas need to be refuted through argument. Indeed, Socrates creates a very detailed theory of the earth within the universe with some very testable aspects (see section 4.4).

This creative idea seems to conflict with the Socrates notion that our ideas enter our minds before we are born and that we simply recollect these thoughts. In the *Phaedo* Socrates says: "Recollection is most commonly a process of recovering that which has been forgotten through time and inattention". Recollection is an image formed in the mind's eye. The statement Plato puts in Socrates' mouth in refuting Simmias' argument of attunement that, "the theory that our soul exists even before it enters the body is the ultimate standard of reality - a view which I have, to the best of my belief, fully and rightly accepted" (Phaedo line 92d). Socrates' notion of conjecture and refutation conflicts with this idea of recollection. Arguably for Socrates, there is no absolute standard of reality, his ideas, images in the minds eye, are risks worth taking (Phaedo line 63c, 84c and114d). Socrates knows that he is not a seer, seeing the past, present and future.

The debate on death and the soul ends with reasoning in the form of syllogistic logic and depicts life and death as "essential opposites". The idea of essential opposities is similar to the perspective of Heraclitus: "the One only exists in the tension of opposites: this tension is essential to the unity of one" (Copleston 1962) (see note 6 below). The conclusion of the debate is a syllogistic argument as follows:

Socrates: What must be present in a body to make it alive?

Cebes: The soul

Socrates: Is there an opposite to life, or not?

Cebes: Yes, there is, death.

Socrates: Does it follow, then from our earlier argument, that the soul will never admit the opposite of that which accompanies it?

Cebes: Most definitely.

Socrates: Well now, then, what name did we apply now to that which does not admit the form of even?

Cebes: Uneven (odd).

Socrates: And what do we call that which does not admit death?

Cebes: Immortal.

Socrates: And the soul does not admit death?

Cebes: No.

Socrates: So soul is immortal.

Cebes: Yes, it is immortal.

Socrates: Well, can we say that that has been proved? What do you think?

Cebes: Most completely.
(Phaedo line 105d, p. 87)

3.4 (section 3.2.1 and 3.2.2) Bursztajn et al. (1990) describe the mechanistic paradigm as consisting of three criteria: (1) deterministic causation - even for "many to many" causal relationships, the list of causes is considered to be known, the way the causes come together to produce the effect in question does not change with time, i.e., the assumption is 100% regularity in the relationship; (2) the "experimentum crucis" - there is a test that establishes once and for all the deterministic causal relationship, i.e. it is possible to account for and control for all other possible causal factors, and the observers have no effect on what is measured (pre Heisenberg's uncertainty principle); (3) the objective/subjective dichotomy - the only knowledge that is thought of as being public is "objective knowledge", that is, knowledge of a world existing independently of an observer. They argue that probability only means a theory of errors accounting for imperfections of observation and measurement and defining acceptable limits within which experimental findings could differ from what the theory predicted.

They describe the probabilistic paradigm in three criteria: (1) probabilistic causation - causes may act and interact differently at different times, the same effects do not always have the same causes, and the effects of a given cause cannot be isolated with certainty, as processes are stochastic, changing probabilistically with time; (2) experiment as principled gambling - the experiment itself does not provide absolute confirmation or refutation of any hypothesis, rather we gamble in choosing which experiments to perform in diagnosis, which hypothesis to test and believe. This second criterion is where ethical concerns are incorporated, as we seek both the true and the good, where we justify our actions and beliefs to another reasonable person; (3) the continuity of the objective and the subjective - we develop our beliefs and values by working and living with other people, and through our relationships we establish what values rational people must agree on, and what areas of disagreement and variation are reasonable.

Bursztajn et al. (1990) develop their position from consideration of Neils Bohr. They did not discuss the more recent perspective of David Bohm. Bohm and Hiley (1993) develop a concise distinction between the perspectives of Bohr, Dirac, and the position which they are proposing. Bohm develops his position, along with Heisenberg, from Aristotle's concept of "potentiality" through the "metaphor of the seed". Bohm and Hiley do not explicitly mention Socrates' conception of the "metaphor of the plant" (see section 3.3.2 for Socrates' account, and note 3.9 for Bohm's).

3.5 (section 3.2.2) Socrates' conceptions are based on having the "eye" focussed inward. Socrates explains this disposition in the *Phaedo* dialogue by contrasting his views when he was young and when he was old. First, when Socrates was young we see his "eye out", as he says to Cebes: "There was a time when I thought I understood the meaning of greater and less pretty well; and when I saw a great man standing by a little one, I fancied that one was taller than the other by a head; and still more clearly did I seem to perceive that ten is two more than eight, and that two cubits are more than one, because two is twice one." This perspective is based on an external standard of measure.

Later in the *Phaedo* Socrates talks about the difference with a new eye: "If a person remarks that A is taller by a head than B, and B less by a head than A, you would refuse to admit this and would stoutly contend that what you mean is only that the greater is greater by, and by reason of greatness, and the less only by, or by reason of smallness; and thus you would avoid the danger of saying that the greater is greater and the less less by the measure of the head, which is the same in both, and would also avoid the monstrous absurdity of supposing that the greater man is greater by reason of the head, which is small. Would you not be afraid of that?"

In this second account the difference in height is accounted for by an internal measure not an external standard like a yardstick. The men are both of the same proportions except that the big man has a little head. This is an internal measure and relates to the concept of *sophrosyne*. This concept informs the concept of caneer (see note 3.7) and health (see section 4.5 the *Charmides* dialogue).

Notice that Socrates suggests that we are risking with the words that we use to describe our concepts. There is danger in the words that we use to communicate, i.e., risking in making things common.

3.6 (section 3.2.2) Bohm's dynamic conception of 'relative autonomy of things' and the conception of "flowing" can be metaphorically conceived through the aid of music. The original meaning of the word "thing" means something occurring at a given time or under certain conditions. A particle and wave can be regarded as abstract, relatively autonomous or independent subtotalities of movement, having a certain recurrence and stability of their basic patterns of order and measure. A particle can be understood as appearing to have a continuous existence relative to the flow of movement much like a forest considered on a large time-scale (perhaps before this century). In a forest constituted of trees, bugs and beasts that are continually dying and being replaced by new ones, over a long-time scale the forest appears continually to exist. Bohm uses the metaphor of music to experience the relative autonomy of a "thing" as process or flowing which cannot be as easily captured with the forest metaphor:

> Consider what happens when one is listening to music. At a given moment a certain note is being played but a number of the previous notes are still reverberating in consciousness. Close attention will show that it is the simultaneous presence and activity of all these reverberations that is responsible for the direct and immediately felt sense of movement, flow and continuity. To hear a set of notes so far apart in time that there is no

> such reverberation will destroy altogether the sense of whole unbroken movement, living movement that gives meaning and force to what is heard. (Bohm 1983, p. 198)

3.7 (section 3.2.2) The idea of cancer and development of the body originates with the Greeks. Anaximander, Plato and Hippocrates conceived of the universe as a whole, Gaia, a single organism, where each part grows and develops in relationship to the whole (analogous to the recent theory proposals). When the relationship of the part to the whole was disturbed, the upset in the internal balance was the part going off on its own - the cancerous growth or birth defect. The organism and the environment in Socrates' metaphor of the plant are the basic oppositions of a unitary whole (see section 3.2.1),. There was constant interplay and the organism grew at the expense of and was held in check by the environment (Brock 1929) (see notes 3.1 and 3.9). The concept of *sophrosyne* is related to the virtue of temperance and refers to proper growth, growth of the right measure or ratio (see note 4.5). Perhaps *sophrosyne* underlies a modern concern expressed by Anderson (1966) in the *Canadian Journal of Public Health,* with respect to the increase in population growth, saying: "It would indeed be a tragedy if the fear expressed by one prominent health statesman became a reality and the world developed cancer - with man himself being the cancer cell."

3.8 (section 3.2.2) Einstein (1983) and Bohm and Hiley (1993) say that both the mathematical and physical ideas are needed. Einstein says "moderns" conceive the axioms of geometry to be empty conceptual schemata and thus the words "point" and "straightline" stand only for empty concepts. That which gives these concepts substance is the physical ideas which are not inherent in mathematics: "As far as the laws of mathematics refer to reality they are not certain; and as far as they are certain, they do not refer to reality" (Einstein 1983, p. 28). Likewise Bohm says that the "two kinds of concepts (mathematical and physical) represent extremes and that it is necessary to be in a process of thinking that moves between these extremes in such a way that they complement each other" (Bohm and Hiley 1993, p. 320).

Dewey (1929) makes a similar distinction, saying: "At one pole, are immediate sense-data which are said to be the immediate and accordingly most certain objects in knowledge of existence: the original material from which knowledge of nature must set out. At the other pole, are mathematical and logical objects" (Dewey 1929, p. 195).

Conceiving the relationship between the mathematical and physical ideas in this manner allows for the physical concepts to develop continually without having to discard the mathematical concepts. This same basic relationship was previously discussed with respect to the principle-based ethics and the need for relational ethics in that the pattern of experience is not, as in mathematics, held together by logical and necessary relations (see section 1.4).

3.9 (section 3.3.2) Modern perspectives in science and philosophy are returning to the ancient Greek thinking. Of particular relevance are the concept of *physis* and the "metaphor of the plant and seed". In this note I will briefly introduce these concepts.

Thales, the founder of Ionian science and philosophy, argued that water was the primary stuff of all things because the seed needs water (Copleston 1962). Thales did not identify with the seed but with the water. Aristotle says he obtained the "notion perhaps from seeing that the nutriment of all things is moist. He got his notion from this fact, and from the fact that the seeds of all things have a moist nature" (Copleston 1962). Note, Thales identifies with the 'water' and his materialistic notions of reality developed into Democratus' theory of atomism cf. (Kahn 1960).

It is with Anaximander that the "metaphor of the plant and seed" develops and pertains to the concept of *physis*. This is the beginning of metaphysics (Windelband 1956). Anaximander thought the universe was one organism and that life evolved from the sea (Copleston 1962). Anaximander says that by means of adaptation to environment the present forms of animals evolved "In the beginning man was born from animals of another nature" (Copleston 1962).

Kahn (1960) presents fragments of Greek writing believed to be Anaximander's ideas about the "metaphor of the plant and seed": Aetius writes: *The first animals were generated in moisture and enclosed in thorny barks; as they grew older, they came out onto the drier [land] and, once their bark was split and shed, they lived in a different way for a short time. Censorinus writes: In these [fishes or fish-like animals] men were formed and kept within fetuses until maturity; then at last the creatures burst open, and out came men and women who were already able to feed themselves.* Diodorus Siculus writes: *It first became hardened under the beaming fire of the sun. Then as its surface was seething with the heat, some moist portions swelled up in many places, and fermentations arose there enclosed in fine membranes [like bubbles]. While the moisture was thus becoming impregnated with life by the heat, the creatures were directly nourished at night from the mist which descended out of the surrounding atmoshpere, and solidified in the daytime by the burning heat. Finally when the fetuses had reached their full growth, and when the membranes were burnt through and split off, all kinds of animals were produced.* (Kahn 1960, p. 109-111).

Notice the seed emerges from within the plant and is the new growth. This is the concept of *physis*. Heidegger (1961) says *physis* "denotes self-blossoming emergence (e.g., the blossoming of a rose), opening up, unfolding, that which manifests itself in such unfolding and endures in it; in short, the realm of things that emerge and linger on" (Heidegger 1961, p. 11).

Heidegger says that "the Greeks did not learn what *physis* is through natural phenomena, but the other way around; it was through a fundamental poetic and intellectual experience of being that they discovered what they had to call *physis*. It was this discovery that enabled them to gain a glimpse into nature in the restricted sense"

(Heidegger 1961, p. 12). What occurred was creative insight. This forms the basis of the Socratic idea that it is our theory that allows us to perceive (see section 3.2.2).

Heidegger says the common translation of the remaining Anaximander fragment reads: *But that which things arise also gives rise to their passing away, according to what is necessary; for things render justice and pay penalty to one another for their injustice, according to the ordinance of time.* Heidegger suggests that "things" are not only things of nature but in the fullest sense means "man, things produced by man, and the situation or environment effected and realized by the deeds and omissions of men, also belong among beings" (Heidegger 1975, p. 21). With Heidegger's thought, contained within the totality we have the Socratic idea of an explicit accounting of the words and deeds, and the effect of our presence on the environment (see Introduction-Method).

Heidegger says the fragment speaks of manifold being in totality: "What is present, whether here or not at the present time, is the unobtrusive name of what expressly comes to language in the Anaximander fragment" (Heidegger 1975, p. 38). Heidegger provides the peotic insight for what is present from Homer's Iliad:

> …and among them stood up
> Kalchas, Thestor's son, far the best of the bird interpreters,
> Who knew all that is, is to be, or once was,
> Who guided into land of Ilion the ships of the Acheans
> Through the seercraft of his own that Phoibos Apollo gave Him
> (Heidegger 1975, p33. taken from Homer, The Iliad, Chapter 1)

Notice the similarity in Homer's metaphor of the seercraft with Socrates', Simmias' and Hippocrates' metaphors for theory, risk, and health care (sections 3.2.2 and 3.2.3). Homer introduces Kalchas as a seer, and this is the science that Socrates is seeking, i.e., the science and knowledge of past, present, and future (section 3.2.3).

Heidegger's purpose is a translation of the Anaximander fragment. Anaximander's thought is from a time before the division of the disciplines, like ethics, jurisprudence, or natural science. Anaximander's thought is not limited by these boundries. Heidegger is trying to remove the simplicity from the common translation and thinks Anaximander says: *along the lines of usage; for they let order and thereby also reck, belong to one another (in the surmounting) of disorder* (Heidegger 1975, p. 57). The word reck is obscure in our thinking and Heidegger suggests it is related to the word care. Reck means turning towards what lingers so that it remains in its essence.

Discovering reck is the need in modern public health practice and for which I argue we can turn partially to Socrates. Socrates' mother was a midwife so possibly he learned the metaphor from her (see section 4.3). Note that Socrates' uses the metaphor of the plant based on the passage from Xenophon (see section 3.3.2) and distinguishes the new and old growth in Plato's *Eurthyro* dialogue (see Introduction). Socrates says the good public benefactor should prevent harm to the new shoots in promoting the emerging bloom of autonomous seeds. With both of these passages the "metaphor of the plant and seed" is used to describe our growth in mind and body within the environment. Care involves attention to both the person and the environment, and requires an explicit accounting of words and deeds (see sections 4.6 and 4.7.2).

Jones (1923) discusses that Hippocrates' humoral theory of opposites, possibly has orgins with Anaximander's conception of the opposites. In the *Ancient Medicine* of the corpus, the opposites of hot, cold, moist and dry, are discussed as powers not as substances. Jones remarks analogously to the Anaximander fragment: "If the body is composed of opposite humours, and if health be the harmonious mixture or blending of them, we shall expect to see one or another 'lording it over the others' in a state of disease" (Jones 1923, p. xlviii).

2

In the *Phaedo*, Socrates critiques his younger days of studying natural science: "this appeared to me to have lofty aims, as being the science which has to do with the causes of things, and which teaches why a thing is, and is created and destroyed; and I was always agitating myself with consideration of such questions as these: Is the growth of animals the result of some decay which the hot and cold principle contract as some have said?" (Phaedo line 96b).

In Plato's *Phaedrus* dialogue, Socrates speaks of Hippocrates conception of *physis* as power. After introducing the basic conception that an understanding of the body is not possible without an understanding of the whole (see sections 3.2.1 and 4.5), Socrates says: "observe then, what it is that both Hippocrates and correct argument mean by an examination of nature. Surely it is in the following way that we must inquire into the nature of anything. In the first place we must see whether that, in which we shall wish to be craftsmen and to be able to make others so, is simple or complex. In the next place, if it be simple, we must inquire what power nature has given it of acting, and of acting upon what; what power of being acted upon, and by what. If on the other hand it be complex, we must enumerate parts, and note in the case of the simple thing, through what natural power it acts, and upon what, or through what it is acted upon, and by what" (Phaedrus 270c,d). This reflects a fundamental tenet of Hippocratic medicine that is accepted today; the only thing healthcare providers can do is to allow nature a chance to work (see section 2.3). The source of this power and its emergence are perhaps the question Socrates addresses in the *Charmides* dialogue (see section 4.5).

Bohm suggests that the root of physics has shifted to Heraclitus, but has not explicitly argued against the perspective of Anaximander (Bohm does not reference his ideas very well). Both Anaximander and Heraclitus saw everything as flowing. Their perspectives can be distinguished with respect to the problem of the "one and the many" (Copleston 1962). Anaximander saw the conflict of opposites as encroaching on the unity of the one, disorderly, something that mars the purity of the one. The key feature is that Anaximander does not see the fundamental ground as any of the known substances, but considers the primary reality to be the infinite or the *Urstoff*. Through a *process of becoming*, the known substances manifest.

In modern physics, Heisenberg (1958) suggests that none of the fundamental particles should be thought of as the primary and that all the particles can be reduced to a fundamental substance which we may call energy. Heisenberg says: "This view of course corresponds to the doctrine of Anaximander, and I am convinced that in modern physics this is the correct view" (Heiseberg 1958, p. 62).

Heraclitus saw the conflict of opposites as essential to the being of the one and that the one only exists as a tension of the opposites; the tension is essential to the unity of the one (Copleston 1962). Heisenberg (1958) suggests that Heraclitus thought that the idea of the "one" does not explain the variety of things or the many. This led to Heraclitus' solution that the principle of change itself is the fundamental principle. Heraclitus suggests that all things are in a state of flux in his statement: "You cannot step in the same river twice" (Heraclitus, Fragment XLI, Jones 1923).

Bohm's perspective is an implicitly orderly universe following the "law of holomovement", an enfolding-unfolding movement. Bohm says: "I regard the notion of process as given by the statement: Not only is everything changing but all is flux. That is to say, *what is* is the process of becoming itself, while all objects, events, entities, conditions, structures, etc., are forms that can be abstracted from this process" (Bohm 1983, p. 48). Perhaps this implicitly makes the distinction between Heraclitus and Anaximander for Bohm. All are concerned with the question "*What is?*", and Bohm and Heraclitus see the answer as the principle of change itself. But is this absolute becoming a relatively autonomous being?

Aristotle presents the "metaphor of the seed" as potentiality in the *Physica*. Aristotle's concept distinguishes the modern concepts of *uncertainty* and *variability*: "not any chance thing that comes from a given seed but an olive from one kind and a man from another" (18, Physica, p. 244). Heidegger (1975) suggests that it is with the Aristotelian-Theophrastian presuppostion that beings means natural things in the narrower sense. Likewise Dewey (1929) discusses the split in ancient Greece, in the philosophies of Plato and Aristotle. There is pure unchanging Being, i.e., the "unmoved mover" and there is the region of change which is always contingent. This is the basic Western metaphysics; only that which is completely fixed and unchanging, the antecedant, can be real. Dewey suggests this basic division led to the split between philosophy and science, theory and practice, knowing and doing. Dewey says "the world of generation is the world of decay and destruction. Whenever one thing comes into being something else passes out of being" (Dewey 1929, p. 19). (Note that Dewey, like Bohm, at times does not discuss the ancient Greeks by name.)

Aristotle's "metaphor of the seed" is the basis for Bohm's and Heisenberg's concept of potentiality. Bohm and Hiley (1993) say:

> Consider a seed, which is evidently not an actual plant, but which determines the potentialities for realizing various possible forms of plant according to conditions of soil, rain, sunlight, wind etc. Thus when the measurement of a given observable was repeated, this would correspond to a plant producing a seed, which grown under the same conditions, produced the same form of plant again (so that there was no continuously existent plant). Measurement of another observable would correspond to changing the experimental conditions, and this could produce a statistical range of possible plants of different forms. Returning to the quantum theory, it is clear that in this approach the apparatus is regarded as actually helping to create the observed results. (Bohm and Hiley 1993, p. 18).

The initial concept is developed in Bohm's (1983) *Wholeness and the Implicate Order* and earlier in (1951) *Quantum Theory*. Bohm's position is distinct from Dirac and Bohr (see note 3.4). Bohm says Dirac would consider that between quantum measurements of the same observable the system continues to exist with the same wave function and thus stands independently of being observed. Bohm says Bohr would not allow for the kind of language that admitted the independent existence of a quantum object and would not regard it as meaningful to talk about, for example, a particle existing between quantum measurements.

As a cautionary note, Heidegger (1961) suggests that the Greeks first raised the question of the essents or existents, things that art, and the essent was called *physis*. This should not be thought of as "nature". Heidegger says: "*Physis* originally encompassed heaven as well as earth, stone as well as plant, the animal as well as man, and it encompassed human history as a work of men and the gods" (Heidegger 1961, p. 12). If *physis* is not taken in the original sense of the power to emerge and endure but as the present signification of nature, the motion of material things, of the atoms and electrons, i.e., what modern physics investigates as *physis*, then the first philosophy of the Greeks becomes a nature philosophy where all things are held to be of material nature (Heidegger 1961).

I would argue that Bohm's thought is also influenced by Anaximander and the concept of *physis*. Bohm's (1983) *Wholeness and the Implicate Order* offers a new conception of the emergence of life and its many forms much like Anixamander. Bohm suggests that quantum theory and relativity necessitate seeing the universe as an unbroken whole of flowing movement analogous to a single organism, which I see as the "metaphor of the plant":

> The interactions between different entities (things, electrons) constitute a single structure of indivisible links, so that the entire universe has to be thought of as an unbroken whole. In this whole, each element that we can abstract in thought shows basic properties (wave, particle, etc) that depend on the overall environment in a way that is much more reminiscent of how organs constituting living beings are related, than it is how parts of a machine interact (Bohm 1983, p. 175).

Bohm suggests that with a mechanistic order, the world is regarded as constituted of entities which are outside of each other, existing independently, and interacting through forces that do not bring about any changes in their essential natures. The machine is the metaphor. The machine is made up of parts that can be stamped out of a form. By contrast, with a living organism, each part grows in the context of the whole, so that it does not exist independently.

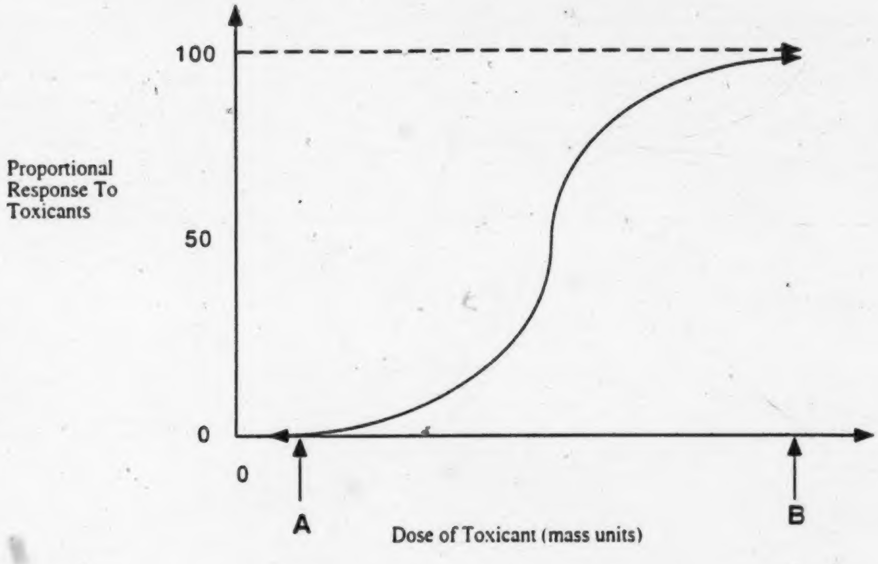
Bohm suggests the meaning of the implicate order is that both inanimate matter and life, consciousness and matter, are projections of a common ground, a single unbroken totality of movement. Bohm says: "a molecule of carbon dioxide that crosses a cell boundry into a leaf does not suddenly 'come alive', nor does a molecule of oxygen suddenly 'die' when it is released to the atmosphere. Rather, life has to be regarded as belonging in some sense to the totality, including plant and environment" (Bohm 1983, p. 194). This is analogous to Heidegger's thought of *physis* encompassing the "stone and the plant" and "words and deeds". Bohm asks, how are we to consider the evolution of life as this is generally considered in biology? Bohm suggests the word evolution is too mechanical, meaning unrolling, and that we should say: "various succesive forms unfold creatively. Later members are not completely derivable from what came earlier, through a process in which effect arises out of cause (though in some approximation such a causal process may explain certain limited aspects of the sequence)" (Bohm 1983, p. 212). Perhaps this is a way of approaching the question of life, and the relation of the cell to protein, RNA, DNA, etc.? (see section 3.2.2).

3.10 (section 3.4.2) Note, Ashford's idea is different from the sliding risk-scale approach, where the underlying assumption is that the weight of autonomy should be determined by the consequential character of the risks, or the severity (see section 2.5.1)

3.11 (section 3.6) The idea that smoking was harmful appeared soon after the introduction of tobacco in 1855 to Europe. Dostoyevsky suggests that smoking is harmful in his novel "Crime and Punishment", first published in 1866. In one scene of the book, Roskolnikov shouts at a police officer for smoking indoors: "You're in a government office, and yet you not only shout, but you're smoking a cigarette as well, which shows that you don't think very much of any of us" (Dostoyevsky 1866, p. 116). Dostoyevsky also has a women protect herself from indoor tobacco smoke: "The front door was open as some protection against the clouds of tobacco smoke which penetrated from the other rooms and threw the poor, consumptive women into long and painful fits of coughing" (Dostoyevsky 1866, p. 197).

3.12 (section 3.6) Tobacco was grown by the Native Indians of North America and introduced to the colonizers. Tobacco growing, chewing and smoking varied among the different Indian tribes. Diamond Jenness (1955) suggests that the Haida Indians grew a tobacco-like plant to chew with lime. However, they abandoned its cultivation as soon as they obtained smoking tobacco from Europeans.

Figure 3.1. Common dose-response curve observed in acute toxicology.

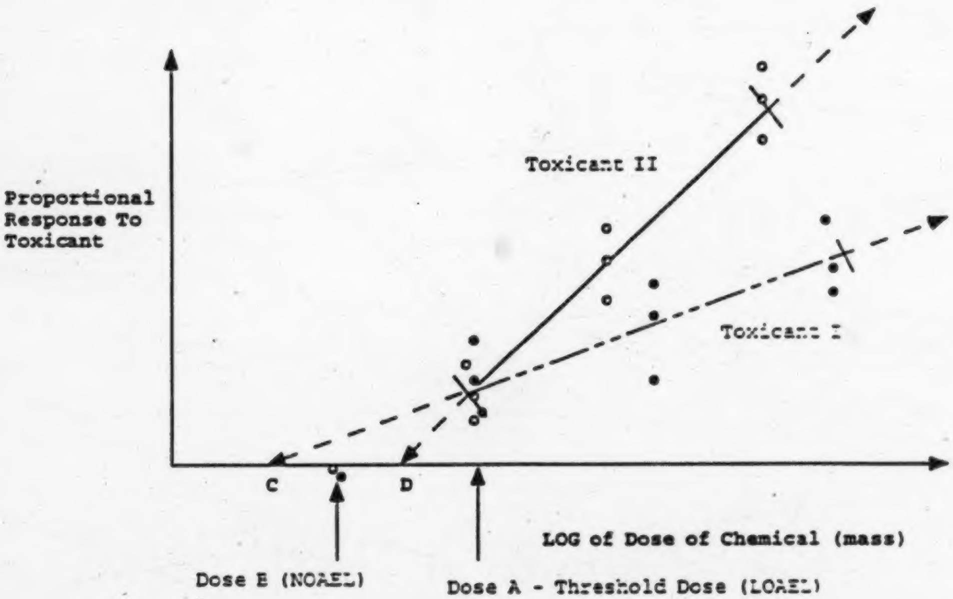


Notice that as the dose increases the percentage of people that are affected from the exposures increases gradually to 100%. There are two "thresholds" (see section 3.3.2). The first threshold occurs where the toxic effects begin to take place, dose A (i.e., in lethal cases where one person dies). The second threshold dose occurs where virtually everyone is affected or dies from exposure to the toxin, dose B.

Notice in Socrates "metaphor of the plant", he gives both regions of the dose-response curve for alcohol (see section 3.3.2). He contrasts the region around dose A, where we reach a playful mood through gentle persuasion, with the region around dose B, where we will be forced into intoxication.

The key ethical question is when should we begin communicating with the public: at 1% response, 5% response, or before any person dies?

Figure 3.2 A simplified straightline dose-response relationship for two toxicants illustrating the concept of potency.



A simplified representation of a straightline dose-response relationship for two toxicants I and II illustrating the concept of potency (see section 3.3.2). A Log Dose vs Response of a toxicant from Figure 1. In this case an experiment of two toxicants at four different doses.

Toxicants I and II both share the same threshold or Lowest Observed Adverse Effect Level (LOAEL) of dose A. Below dose A, no individual organism responds to the toxicants in the particular experimental (see section 3.3.2). The two toxicants share the same No Adverse Effect Level (NOAEL), dose B.

The dashed lines indicate the linear extrapolation of the dose-response curve beyond the region of the scientific data (i.e., both low and high dose extrapolation), shown by points on the graph. For toxicant I, the threshold may actually be somewhere between dose A and dose C, using the simple straightline dose-response relation. Likewise, for toxicant II, the threshold dose may lie somewhere between dose A and dose D. The slope of the dose-response curve for toxicant II is steeper than for toxicant I. This means toxicant II is more potent than toxicant I, even though they have the same threshold or LOAEL.

The LOAEL is used to determine the "safe" dose of exposure, by dividing the LOAEL by appropriate safety factors. The NOAEL, the highest dose where no effects are observed, is used when it is available (see sections 3.3.2 and 3.8.2).

Table 3.1 The Hill (1965) Causal Criteria

1. Strength of Association - What is the relative difference of effects between groups exposed and not exposed?

2. Consistency - Has there been a repetition of the circumstances and observations?

3. Specificity - What are the specifics of the cause and effect: "one to one", "many to many" relationships?

4. Temporality - Does the cause precede the effect?

5. Biological Gradient - Is there a dose-response relationship between cause and effect?

6. Plausibility - Is there biological knowledge of the relationship between cause and effect, a mechanistic understanding?

7. Coherence - Is the result consistent with known natural history and biology of the disease?

8. Experiment - Can the cause and effect relationship be tested experimentally?

9. Analogy - Is the cause and effect relationship similar to other known relationships?

Table 3.2. History of Cancer Public Health Risk Communication in the *Canadian Journal of Public Health*

1929
McIntosh JW. Cancer and Tuberculosis. 1929; 20:600-609.

1930
Miller J. A Comment on Cancer and Tuberculosis. 1930; 21:174-176.

1932
McCullough JW. Cancer at Home and Abroad. 1932; 23:203-208.

1933
Richards GE. The Role of Radiology in the Prevention of Cancer. 1933; 24:29-39.
McClullough JWS. Early Diagnosis of Cancer. 1933; 24:41-42.
Bulmer FMR. Health Hazards From Specific Poisons in Industry. 1933; 24: 155-161.
Bloodgood JC. How to Reduce the Cancer Mortality. 1933; 24:562-565.
Davison RO. Saskatchewan's Program for Cancer Control. 1933; 24:566-571.

1934
MacKlin MT. The Value of Accurate Statistics in the Study of Cancer. 1934; 25:369-373.

1937
Sellers AH. Book Review: Hoffman (1937) Cancer and Diet, 1937; 28:521-522. (the book argues that smoking causes cancer)
Zeidler FAJ. Wagner WJ. The Lead and Arsenic Content of Canadian Domestic Tobaccos. 1937; 38:582-586.

1938
Barrett HM. Atmospheric Pollution in Toronto, Canada. 1938; 29:1-12.
Sellers AH. Cancer in Ontario. 1937; 29:387-395.

1947
Stovall WD. A Program for the Control of Cancer. 1947; 38:416-421.

1949
McKinnon NE. Breast Cancer Mortality, Ontario, 1909-1947: The lack of any decline, and its significance. 1949; 40:257-269.
McKinnon NE. Cancer Mortality, Ontario, 1921-1947. 1949; 40:341-347.

1950
Wilton MH. Health Aspects of Air Pollution. 1950; 41:140.

McKinnon NE. Cancer Mortality Trends in Different Countries. 1950; 41:230-240.
Watson TA. Incidence of Cancer in Saskatechewan in 1948. 1950; 41:308-313.
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1951

McKinnon NE. Breast Cancer: The Fallacy of Comparison of Dissimilar Groups in Appraising Treatment. 1951; 42:88-94.
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McKinnon NE. Cancer of the Breast: The Invalid Evidence for Faith in Early Treatment. 1951; 42:218-223.
McKinnon NE. Cancer Mortality Trends versus Clinical Claims of Cure. 1951; 42:359-366.
Watson TA. Diagnosis of Cancer in Saskatchewan, 1932-1949. 1951; 42:427-432.

1952

McKinnon NE. Cancer of the Breast: Invalid evidence of Increase. 1952; 42:10-13.

1957

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1958 The First Mention of the Relationship of Smoking and Cancer Since The 1930s

Godden JO. The Prevention of Carcinoma of the Lung. 1958; 49:232-239.

1964

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1971

Mathews VL. Federal Legislation to Ban Cigarette Advertising. 1971; 62:366-367.

Table 3.3. Ashby et al. 1997 nine criteria suggested by Hill (1965) for distinguishing associations of the two areas known.

Hill Criteria	56 chemical carcinogens to humans	chemical endocrine toxicities in humans
Strength of Association	+	- b
Consistency	+	-
Specificity	+	-
Temporality	+	-
Biological Gradient	+	-
Plausibility	+	+
Coherence	+	+
Experiment	+	?
Analogy	+	?

+ criteria for causation met
- criteria for causation not met
? criteria for causation partially met
Note: structure activity relationships are poorly defined for endocrine toxicity. Many endocrine toxicities have been produced in rodents, but these do not necessarily stimulate effects in humans as only diethylstilbestrol is available for study.
b - except for diethylstilbestrol

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Chapter 4. Socrates' Ethical Perspective: Fostering Autonomy in Public Health Risk Communication

4.1 Introduction

The purpose of this chapter is to further develop relational ethics by developing the concept of fostering autonomy through mutually respectful relationships grounded in the Socratic dialogues of Plato (428-327 B.C.) and Xenophon (428-354 B.C.) (see Introduction). The relational ethics model is developed as a framework for health risk communication for public health derived from the bioethics literature. This model provides a theoretical basis for the practice of ethical health risk communication in line with the historical *desideria* of ethical risk communication traced over this century in the *Canadian Journal of Public Health* (see section 1.5).

Relational ethics develops from a dialectic between principle-based ethics and the less well-articulated ethic of care (see section 2.4). The goal of relational ethics is the construction of mutual knowledge through narrative, developing concrete meaning. Construction of mutual knowledge elaborates the principle of respect for autonomy with the concept of "fostering autonomy". Fostering autonomy recognizes that we do not exist independently of our relationships. It is through our relationships with each other and with the environment that we define who we are (see Introduction, section 3.3.2 and note 3.9 for Socrates' "metaphor of the plant").

Fostering autonomy through mutually respectful relationships is the middle ground between the healthcare provider in a stand-alone paternalism/beneficence model and a person, as a recipient of health care, in a stand-alone autonomy model (see section 2.6.3). Fostering autonomy is characterized by Plato's presentation of the "double process" for healthcare relationships (Laws IV line 720c, Emanuel and Emanuel 1992). The *person stand-alone autonomy* model embraces the idea of autonomy as noninterference, generally held in nondirective counseling, neutral risk communication and consumer models of health care. The *healthcare provider stand-alone* *paternalism/beneficence model* is the traditional model of health care, the paternalistic model that develops from Hippocrates (~460 to 430-370 B.C.) and which has dominated health care practice, both in medicine and public health, for nearly 2,500 years (see section 2.3, and 2.6, Pellegrino 1993, Laine and Davidoff 1996). I cast doubt on the assumption that the stand-alone model develops from Hippocrates in section 4.5 (below).

I recast the ethical approach to public health risk communication by considering the precepts of Socrates (470-399 B.C.). I postulate that Socrates had the same basic relationship with the public in Athens as public health providers should have today with Canadians: Socrates *knocked on the door of the public*; his office was the community streets (Cornford 1981). He did not wait for the community to come to him, as is the case with the practice of health care. Socrates motivated Athenians, both young and old, to examine the reasons for their choices in life thus helping people develop their personal narratives. His basic principle was "think for yourself" and is the basic idea behind the concept of fostering autonomy. I show that Socrates conceived of ethics as an *affective attitude* shaping relationships. From it, I derive a contextual approach to ethical public health practice.

The chapter is structured into six sections. Section 4.2 describes the basic conception of fostering autonomy. Section 4.3 introduces the historical Socrates, and presents the elements of Socrates' activity that relate to the concept of fostering autonomy. Section 4.4 presents the deliberative and existential dimensions of autonomy through Socrates' perspective in the *Phaedo* dialogue. The existential dimension of autonomy was recognized in the life of Socrates by Kierkegaard and Nietzsche. The present models of healthcare relationships and risk management consider only the deliberative dimension, and these are complimented by considering the existential dimension (Emanuel and Emanuel 1992, N.R.C. 1996).

Section 4.5 presents the *Charmides* dialogue where Socrates is a healthcare provider committed to healthcare relationships. Section 4.6 presents a second important relationship of Socrates through the introduction to the *Protagoras* dialogue, where Socrates introduces the concept of risk and fosters the autonomy of Hippocrates the boy.[1] The qualities of an ethical risk communicator are distinguished through Socrates' relationship with Protagoras. The *Protagoras* dialogue also provides insight into the relationship of Socrates and Hippocrates of Cos, the doctor. I cast doubt on the current perspective of Hippocrates of Cos, in keeping with Heidel (1941), and argue that he is not the source of "paternal healthcare relationships". In the final section 4.7, I present a relational ethics conception of risk that extends the ideas developed in the *Protagoras*. Risk is developed by considering other Platonic dialogues: the *Laches*, *Phaedo*, *Laws*, and *Timaeus*. The relationship between the public and healthcare providers is developed by considering the "Allegory of the Cave" in Plato's *Republic VII*. I argue that Plato portrays Socrates as public benefactor. Throughout the chapter, health risk communication is discussed in reference to chemical contaminants in the environment (see Chapter 3).

4.2 Fostering Autonomy

Relational ethics uses the concept of fostering autonomy through mutually respectful relationships. For public health, this idea necessitates initiating dialogue with the public of all ages on risk, and through the experience of risking together, in the community streets, the relationship and the dialogue take shape. The goal of the dialogue is to create a shared perspective from which to deliberate about and experience risks.

Fostering autonomy through dialogue has five elements: (i) developing an open mind, (ii) developing one's own perspective, (iii) seeking the opportunity for creative insight and new facts to modify one's prior perspective, (iv) seeking the opportunity for expression of the perspectives of others and, (v) generating motivation. The five elements of fostering autonomy have been drawn from a number of sources, and should be seen as helping people become *educated* rather than *indoctrinated* (Bauman 1993, Bohm 1983, Buber 1971, Bursztajn et al. 1981, Campbell 1990, Dewey 1929 and 1947, Downie 1990, Emanuel and Emanuel 1992, Foucault 1988, Gadow 1980, Kessler 1979, Pellegrino 1985, Szasz and Hollander 1957).

Further, fostering autonomy requires mutual respect, trust, security, compassion, empathy, humility, as do any meaningful relationships. Henson (1997) views the consequences of fostering autonomy as generating: (i) a sense of situational control, (ii) self-care and personal health responsibility, (iii) healthcare provider accountability, (iv) increased satisfaction with relationships, and (v) new creativity in healthcare practice.

Buber (1971, also see Abramovitch and Schwartz 1996) provides a starting point in describing a *genuine dialogical* relationship:

> There is genuine dialogue - no matter whether spoken or silent - where each of the participants really has in mind the other or others in their present and particular being and turns to them with the intention of establishing a living mutual relation between themself and them. (Buber 1971, p. 304)

Buber distinguishes this relationship from technical dialogue, which is prompted solely by the need for objective understanding, and a monologic relationship, masquerading as dialogue, where people do not make real connection with others in the community in which they live.

The key notion in Buber's relationship is the idea of "turning to another person". This means the public heath risk communicator turns to the public, initiating the dialogue. Further, turning to a person makes the distinction from seeing the person as a scientific object (see section 2.5.1). Buber says that *turning towards another person* is realizing that person in their particular existence, even to the extent of experiencing the situations from *their* perspective and mitigating the risk of a monologue or technical dialogue. However, Goldie (1982) warns about the risks of "speculating" about another's perspective (see section 2.5.1). Thus, *turning to another person* requires actually being in the community for people, to share the experience of the risks of life in the community face to face. This is very much in accordance with the perspective developed by Bladen and Rosen in the *Canadian Journal of Public Health* (see section 1.5).

Furthermore, this involves motivating the public to want to share a relationship with public health risk communicators, not to turn away, but to be motivated to learn about the risks that we are taking as a society, and motivated to want to take risks in relationship with public health practitioners; that is motivated to care for self and environment. Therefore, public health risk communication is about creating relationships, creating perspectives, creating understandings, and creating motivation to want to learn and be involved in the relationship.

Motivation has both intrinsic and extrinsic factors. Intrinsic motivation comes from within each individual, where motivation is a personal attitude toward life (Peters 1966). However, each individual will not be motivated by the same message, by the same experiences, or by the same risks. This requires a pluralistic approach to health risk communication. Extrinsic motivation stems from admiration felt for the teacher and provides the most powerful incentives for learning, all of which, in the end, leads to and depends on intrinsic motivation (Peters 1966). This is precisely what Socrates provided for the community in Athens, motivating both children and adults alike, using his own intrinsic motivation, his thirst for knowledge and persistence on his quest. Xenophon says: "He made those who spent time with him hope that, if they followed his example, they would develop the same character" (Xenophon 1990, Memoirs 1.2, p. 73).

Public health risk communication at its most "distant stance" from the community involves motivation within a one-way communication. The tobacco health advisories use fear and expectation of harm as an extrinsic form of motivation. As suggested in section 3.6.2, perhaps this should be balanced with a message that provides some positive incentives, the positive risk of eating fruits and vegetables to mitigate the tobacco risk. "Eat an apple or a peach with every cigarette to offset some of the risk" could be the new public health advisory. However, the most certain and effective way to manage tobacco risk is to eliminate consumption of tobacco products, period.

4.3 Introduction to the "Good Side" of the Historic Socrates

Socrates was alive at the time of the Ionian science tradition. Thales, its founder, developed geometry by abstracting the Egyptian system for measuring land from its everyday practice (Cornford 1981). It developed into the concept of measure, the proper ratio or balance between things, and enabled the development of rule-based reason (i.e., the ability for formal deliberation in science and ethics) and the concept of physical, biological, and social relationships. Thus, measure does not refer to an external standard to which things are compared, but to an internal standard, *sophrosyne*, relative excess or deficiency, the virtue of temperence, perhaps along the lines of Socrates' "metaphor of the plant" (see notes 3.5 and 3.7).

Socrates' mother was a midwife, "a fine buxom women called Phaenarete" (Theaetetus line 149). I suggest Socrates develops his approach to studying and relationships from the experience of his mother as a midwife. This is the root of "relational ethics" (see section 2.4). The midwife maxim is that "it is beyond the power of human nature to achieve skill without any experience" and thus only women who had experienced birth personally were considered capable of serving as midwives. This is the fundamental tenet of Socrates' ethical perspective in the *Laches* and the "Allegory of the Cave" (see section 4.7.2.2 below).

Socrates had significant knowledge of the action of chemicals and the basic principles toxicology: the threshold concept, the meaning of scientific experiments, the dose-response relationship, the concepts of *uncertainty* and *variability* including the distribution in the population, and the fundamental relationship of organism-environment through the "metaphor of the plant" (see section 3.3.2). This knowledge was possibly learned from his mother, as he says: "With the drugs and incantations they administer, midwives can either bring on the pains of travail or allay them at their will, make a difficult labor easy, and at an early stage cause a miscarriage if they so decide" (Theaetetus line 149d). In the *Charmides*, Socrates acts as a healthcare provider, and in the *Phaedo* dialogue claims to have studied natural science when he was young, saying:

> I had an extraordinary passion for that branch of learning called natural science. I thought it would be marvelous to know the causes for which each thing comes and ceases and continues to be. Is it with the blood that we think, or with air or the fire that is in us? Or none of these, but the brain that supplies our senses of hearing and sight and smell, and from these memory and opinion arise.....until I came to the conclusion that I was uniquely unfitted for this form of inquiry." (Phaedo line 96b) (see note 2 for the context and importance of Socrates' observation)

From this study of natural science Socrates developed the use of *theories* saying "I decided that I must have recourse to theories, and use them to discover the truth about things" (see section 3.2.2, Phaedo line 99d).

Further, the writings of Xenophon support Socrates' concern for care of the body and his public health perspective. Xenophon says that Socrates neither neglected the body himself nor commended others for doing so (Xenophon 1990, Memoirs of Socrates 1). Xenophon argues that Socrates encouraged self-discipline with regard to food, drink and sex. Socrates' concept of "know thyself" relates to self-discipline, temperence or *sophrosyne*, and is derived from the idea of "care for thyself". This is the subject of the *Charmides* dialogue where Plato presents Socrates as a healthcare provider (see section 4.4 below). Indeed, Socrates suggests similar measures as Hippocrates of Cos and which are advocated in public health practice today (Heidel 1941, see section 3.1 and note 3.1). Socrates says:

> The body is valuable for all human activities, and in all its uses it is very important that it should be as fit as possible. Even in the act of thinking, which is supposed to require least assistance from the body, everyone knows that serious mistakes often happen through physical ill-health. Many people's minds are often invaded by forgetfulness, despondency, irritability, and insanity because their poor physical condition that their knowledge is actually driven out of them.

> On the other hand, those who are in good physical condition have ample cause for confidence and run no risk of any such misfortune through debility. (Xenophon 1990, Memoirs of Socrates 3, p. 172)

Xenophon says: "Socrates disapproved of over-eating followed by violent exercise but approved of taking enough exercise to work off the amount of food that the mind accepts with pleasure. He said that this was quite a healthy practice and did not hinder the cultivation of the mind" (Xenophon 1990, Memoirs of Socrates 1, p. 73). Socrates argues for exercises to improve health of the body as a whole. Socrates was mocked for being a “dancer”, and advocating this as a health measure, but he replied: "Are you laughing because I'm bent on this kind of exercise, not wanting to develop my legs at the expense of my arms like a runner, nor my arms at the expense of my legs like a boxer, but by working hard with my whole body to make it evenly proportioned all over?" (Xenophon 1990, the Dinner-party 2, p. 233)

Later in life, Socrates is said to have made a philosophical turn by shifting perspectives, whereby the "eye" no longer focused on the external workings of nature, as in the Ionian science, but turned inwards to the self, to the inner world (Cornford 1981, Jowett 1974, see note 3.5). This turning of the eye inward resulted in a formal and abstract approach to the study of ethics in the Western tradition, i.e., an attempt to know the order and purposes of human life. Socrates wanted to know *why* things happen, as opposed to the mechanical idea of Ionian science's describing *how* things happen. Hippocrates apparently shared Socrates' discontent with the Ionian science tradition, in particular the occupation of searching into the first causes of the universe rather than the study of the conditions of existence here and now (Cornford 1981, see note 3.2).

Socrates was arguably part of the cult of Delphi, and perhaps the voices he heard in life, "the different forms at different times" (Phaedo line 60e), are those of Apollo and Dionysus. He says in the *Apology*: "I shall call as witness to my wisdom the god at Delphi" (Apology line 20e) (see section 3.2.1, note 3.3, and section 4.4 below).

Delphi is the most venerated shrine in ancient Greece (Stapleton 1978, Kirk 1974). Apollo is the Greek god of medicine, order, music and prophecy, and represents a level of moral excellence. Dionysus represents the force of life in all growing things, animal and vegetable. He embodies the irrational element in human beings, and Dionysian myths conflict reason and social convention with the emotions. However, it is notable that Apollo welcomes Dionysus to Delphi, the point being that Dionysiac religion was as necessary to humans as was Apollonian. Note that Plato's concept of human being is a mix of the rational and irrational (see section 4.7.1).

Socrates says in the *Apology* that he sought after the meaning of the Delphic oracle which had proclaimed to Chaerephon that "no man was wiser than Socrates" (Apology line 21). The Delphic oracle, sometimes called the oracle of the god Apollo, is generally deemed the "voice of order". With a humble awareness of the limitations of his own knowledge and "conscious of his ignorance", Socrates concludes that it was knowledge of his own ignorance that lead the oracle to deem him to be wise. Socrates says: "Professional experts, on the strength of their technical proficiency, claim a perfect understanding of every other subject" (Apology, line 22d) and therefore lack wisdom.

Socrates was particularly concerned with Sophists, the freelance educators and "experts" of Greek society, although they did not share a common doctrine (Copleston 1962, see Apology lines 21-23, and section 4.6.2). Sophists were masters of communication or rhetoric; they believed they could persuade or manipulate an individual to accept any proposition. The Sophists were for hire by people who wanted power in society. For example, Callicles expresses a popular prejudice, much like social Darwinism, that "both among all animals and in entire states and races of mankind it is plain that right (power) is recognized to be the sovereignty and advantage of the stronger over the weaker" (Gorgias, line 483d). This argument supports hierarchical thinking and slavery in Greek society, and Callicles attempts to glorify the despot (MacIntyre 1966).

Socrates' claims about Sophists are supported by writings in the Hippocratic tradition, discussing problems with science culture and communication to the public, the illiterate, very much like our times. Ironically, the author of this essay is believed to be a Sophist, Protagoras or Hippias (Jones 1923):

> There are men who have made a business of abusing the sciences and, although they would not confess it themselves, their aim nevertheless is simply to display their own knowledge. But it seems to me that it is the aim and function of an intelligent mind to make new discoveries in whatever field such investigations may be useful, and also to bring to completion tasks that are but half-finished.
>
> On the other hand, a desire to belittle by abuse the scientific discoveries of others and to slander the discoveries of the learned to the illiterate, rather than to offer constructive criticism, is not so much the aim and function of an intelligent mind as a proof of a warped character and want of skill. Those who have the ambition to be scientists but not the necessary ability are equipped only for the malicious habit of slandering their neighbor's work if it be right, or of censuring it if it be wrong. (Chadwick and Mann 1950, The Art of medicine. p 81)

There are four specific aspects of Socrates' life that serve as a model for public health and the concept of "fostering autonomy". Recall that the ethical principles of beneficence and non-maleficence are held by Socrates and Hippocrates of Cos (see section 3.1 for this discussion).

First, Socrates considers himself the *public benefactor* and spent most of his days working for the benefit of the Athenians. Socrates models the public benefactor after a good gardener in the Eurthryo (see Introduction). Indeed, many healthcare providers may relate to Socrates' personal dilemma:

> Does it seem natural that I should have neglected my personal affairs and endured humiliation of allowing my family to be neglected for all these years, while I busied myself all the time on your behalf, going like a father or brother to see each of you privately, and urging you to set your thoughts on goodness? (Apology line 31b).

Socrates thought of the *public benefactor* as modeled after Prometheus: "I liked Prometheus in the myth better than Epimetheus; so I follow his lead and spend my time on all these matters as a means of taking for-thought for my whole life" (Protagoras line

361d). Prometheus means "the forseeing" (Stapleton 1978). In an early version of the myth, Prometheus is given credit for creating people from clay and providing people with the means to take care of themselves (Protagoras line 320d).

In Aeschylus' (525-456 B.C.) play *Prometheus Bound*, Prometheus steals fire from the gods and gives it to people so that they can have means to survival, and further, teaches people all the things that make them different from the beasts, the skill of *techne*: how to use tools and metals, how to understand the positions of the stars and how to heal with herbs (Stapelton 1978). Socrates, through the concept of fostering autonomy, created people as centers of meaning. The source of Socrates' means of fostering autonomy may also be found with Aeschylus, as Aristotle (384-322 B.C.) tells us the "number of actors was first increased by Aeschylus, who curtailed the business of the chorus, and made dialogue, or spoken portion, take the leading part in the play" (Aristotle, the Poetics, McKeon 1941, 1449:15, p. 1459), although Socrates claims Homer as his source (see section 4.6.2). Plato maintains this *public benefactor* aspect of Socrates' life in the "Allegory of the Cave" (*Republic VII*) as a responsibility to live in the community, helping people to see with the fire in the cave (see section 4.6 below). Socrates is there for the benefit of others.

Second, Socrates motivates people to want to learn. In the *Apology*, Socrates calls himself the "gadfly" because he brought people to see their ignorance, in particular the experts of his day. Socrates says the city is like "a large thoroughbred horse, which because of its great size is inclined to be lazy and needs the stimulation of some stinging gadfly. It seems to me that God has attached me to this city to perform the office of such a gadfly, and all day long I never cease to settle here, there, and everywhere, rousing, persuading, reproving everyone of you" (Apology line 30e). Socrates as gadfly shows people knowledge of their ignorance, which assumingly provides the motivation to search for knowledge and understanding. This aspect was called *elenchus*, or refutation (Teloh 1986) and is what Popper saw as scientific (see section 3.2.1). Socrates challenges people to examine their lives so that they could avoid living purely by tradition, or imitation. This is particularly relevant to many health and environmental risks, as arguably they are a manifestation of our cultural habits.

Third, Socrates calls himself a 'midwife' after his mother's occupation (Theaetetus, line 149), as he helps people to learn through drawing knowledge out of them through his questions. This was particularly apparent in his education of children and was called *psychagogia*, or psyche leading (Teloh 1986). Socrates' approach was person-specific. His dialogue and questions were orientated to the specific needs of the person with whom he was talking (Xenophon 1990, Memoirs of Socrates 4.1, p. 177).

Fourth, Socrates through the example of his own life provides a source of extrinsic motivation, influencing the intrinsic motivation in others to want to learn and help people. As mentioned previously, this has been identified as a key to motivating people (Peters 1966). If public health is to motivate the public towards healthy practices and healthy communities, there needs to be a conscious attempt to become involved in community life, forming relationships with individuals and community groups to convey one's own motives for health risk avoidance.

The divergence of Socrates from "our" Hippocratic tradition is evident in his relationship with people. In contrast to the paternalism of the Hippocratic tradition (see section 2.3, Pellegrino 1993, Laine and Davidoff 1996), Socrates did not want to indoctrinate people with his perspective. He emphasized personal autonomy, free thinking and open questioning which are considered the basic ideals of scientific investigation. Socrates says:

> I have never set up as any man's teacher, but if anyone, young or old, is eager to hear me conversing and carrying out my private mission, I never grudge him the opportunity; nor do I charge a fee for talking to him, and refuse to talk without one. I am ready to answer questions for rich and poor alike, and I am equally ready if anyone prefers to listen to me and answer my questions. If any given one of these people becomes a good citizen or bad one, I cannot fairly be held responsible, since I have never promised or imparted any teaching to anybody, and if anyone asserts that

> he has have ever learned or heard from me privately anything which was not open to everyone else, you may be quite sure he is not telling the truth. (Apology line 33b)

Socrates' method of dialogue avoids the risk of people simply adopting his perspective, and thus was careful not to unintentionally manipulate people (Nagley 1980). Socrates did not want to become the new authority, nor have people simply repeat his position without understanding. He was concerned with developing people's autonomy, fostering their own search. Through his method of dialogue, Socrates provides people with a *process of becoming*, to know themselves through their own thinking, to develop their own perspective, to analyze their own life, reasons for action, and thus improve their own mind. This enables people to examine the reason of their life and deliberate their decisions. Like Kant (see section 2.3), Socrates' emphasis is on consciously choosing, rather than merely conforming.

In summary, Socrates' activity develops from the midwife's role for others, supporting birthing in a *process of becoming*, involving care of both the body and soul. Socrates provides a person-specific "process of becoming" such that each person can develop both their own eye and care for their soul and body. Socrates' approach to ethics is an affective attitude that manifests concretely in the action of fostering autonomy.

4.4 The *Phaedo*: Socrates' Eyes - Deliberative and Existential Autonomy

Fostering autonomy contains two dimensions: deliberative and existential. The distinction between the deliberative and existential aspects of autonomy were discovered in the life and practice of Socrates by Kierkegaard (1813-1855) (Kierkegaard 1846, Nagley 1980, Sarf 1983, Weiss 1971). The existential dimension was also recognized in Socrates by Nietzsche (1844-1900) (Nietzsche 1870) (apparently independently of Kierkegaard).

The existential perspective on risk asks the question: What does it mean for me to be risking? From this perspective, the emphasis is the meaning for a particular individual, i.e., the subjective nature of risk. The focus is on the meaning for a person who is risking and not the abstract notion of what is risk. The emphasis is placed on the verb - the activity of risking in the moment. Kierkegaard recognized that Socrates was interested in this existential question, aware of the significance of existence, that the knower is an existing individual within the world and thus subjectivity is the truth.

The existential distinction can be illuminated by considering the "existential eye" provided by Socrates - the eye on the road. On the days before his execution, Socrates changed perspectives about his life. Cebes questions Socrates about his recent occupation with popular music, art, and thus he recounts his personal narrative:

> I had no idea of rivaling him or his poems; which I knew that I could not do that. But I wanted to see whether I could purge away a scruple which I felt about certain dreams. In the course of my life I have often had intimations in dreams "that I should make music". The same dream came to me sometimes in one form, and sometimes in another, but always saying the same or nearly the same words: Make and cultivate music, said the dream.
>
> And hitherto I had imagined that this was only intended to exhort and encourage me in the study of philosophy, which has always been the pursuit of my life, and is the noblest and best music. The dream was bidding me to do what I was already doing, in the same way that the competitor in a race is bidden by the spectators to run when he is already running.
>
> But I was not certain of this, as the dream might have meant music in the popular sense of the word, and being under sentence of death, and the festival giving me a respite, I thought that I should be safer if I satisfied the scruple, and in obedience to the dream, composed a few verses before I departed. And first I composed a hymn in honor of the god of the festival, and then considering that a poet, if he is really to be a poet or maker, should not only put words together but make stories, and as I have no invention, I took some fables of Aesop, which I had already at hand and knew, and turned them into verse. (Jowett 1992, Phaedo, line 60e)

Notice, Socrates wavered on the meaning of his own life. Socrates says during his trial that his supernatural experience was "a sort of voice which comes to me, and when it comes it always dissuades me from what I am proposing and never urges me on" (Apology line 31d). But notice a month later, just before his execution, this changed: the dream urges him on, cheering the runner. Indeed, this is a different voice, the voice of Dionysus, the spirit of nature coming on. Socrates experienced uneasiness about his own system and changed his mind; he sang the popular music of Dionysus in fear of disobeying the dream (Nietzsche 1870). Like a scientist, Socrates emphasizes the creative in his hymn for Apollo whom he heard up to his last days. Socrates has his eye on the uncertain expectations of the future. Life is a contingent affair.

Socrates' emphasis in recounting his own story was not the abstract universal "meaning of dreams" but what the dream meant for him, how his actions were affected by the dream. Socrates was concerned that people just follow along with the crowd living unexamined lives, not really thinking for themselves, questioning the reasons for their actions, living their lives as spectators not runners. To exist means realizing oneself through free choice between alternatives, through self-commitment (Copleston 1977). Socrates questioned himself, deliberating his own reasons for what he was doing, and then he began a new course based on this questioning. Socrates was open to self-questioning.

Existentialism resists an all-embracing objective understanding of the universe - abstract idealism. It posits an irreducible aspect of subjectivity in the dimensions of our lives. Existential autonomy expresses the idea that decisions cannot be proven right or wrong by a rational decision scheme (Copleston 1977, Callebresi and Bobbit 1978, Minogue 1996). No objective account or synthesis can do justice to a person's concern for their own life. Indeed, what scientific experiment distinguishes the ethical weight? When do the "facts speak for themselves" in the movement from "one to one" to "many to many" causal relationships, saying: This is an unnecessary "evil"? Retrace the series of subjective poses of scientists and public health providers over this century with respect to tobacco smoke, alcohol and chemical contaminants in the environment (see Chapter 3): When have the facts spoken?

While deliberation may help illuminate consequences and values, decisions are inherently subjective. Can we ever really transcend our own subjectivity? This subjectivity has been expressed as "gut reactions" in decision theory (Resnik 1987). Fundamental decisions are not grounded solely in reason, but in a commitment to values held by the decision makers (Copleston 1977, Callebresi and Bobbit 1978, Minogue 1996). What values have been claimed by "public health providers" in Canada in not communicating the tobacco and alcohol risks (see section 3.6 and 3.7), or in knowingly releasing chemical contaminants to the environment that would bio-accumulate in wildlife and people (see section 3.8.1)? Tragically, Socrates remained to be killed for the sake of the whole. He refused his friends' efforts to free him from prison. Socrates' actions claim the value of community as a whole - he refused to go off on his own.

From this perspective, people make decisions by faith or intuition, by following and claiming their values. Further, through the decisions we make, as individuals and communities, we define ourselves and are responsible for the persons and communities we become (Callebresi and Bobbit 1978). By arguing that our particular chemical emissions are insignificant, following the logic of rational self-interest, we relinquish responsibility for the degradation of the environment and the individuals whom we collectively affect. However, can we ever know which are the right values - are the values themselves at risk?

Existential autonomy has practical importance in health risk communication that is not expressed in purely deliberative models. In genetic counseling, Kessler (1992) points out that risks to the developing fetus and child strike to the heart of a parents' "self system". Parents are filled with fear, anxiety, guilt and shame. They need opportunity to tell their story, to emote and obtain understanding. Kessler suggests that "after the cognitive banquet of facts and figures is over, the real genetic counseling begins" (Kessler 1992, p. 1). The meaning to mothers of the risks of toxaphene, dioxins and PCBs in fish to the developing fetus cannot be captured by a risk number. Kessler suggests that most genetic counseling is on the meaning of the percentage risk number. Counseling does reduce the discrepancy between the meaning of the risk number between counselor and parent. Although, in review of three specific studies of 1,000 counselees, only 22% had accurate recall of the risk number after counseling, and 50% had accurate knowledge of the risks after counseling. Kessler further states that, after 20 years of genetic counseling, it still remains a "black box"; we don't know how counseling affects decisions, how it helps people, what aspects of communication help people, and what risk means to people. Kessler suggests that we need detailed documentation of our dialogues with people, a qualitative analysis, in order to understand the process of risk communication.

Similarly, Bursztajn et al. (1981) comment that patients often question formal decision analysis: "What do the percentages have to do with me?" They contrast the exact numerical expression of probability estimates with their inexact origins from different individuals. Bursztajn et al. suggest that decision analysis cannot tell us how to act; rather, it contributes substance to deliberations, but we need to risk consciously to take the existential leap.

In contrast, from a deliberative perspective, the central question is: What is the risk? The question is about abstracted knowledge, "What is X?" Risk in this context is a noun and could be considered abstract "objective knowledge", the objective property like the risk number. The deliberative perspective is the aspect of Socrates that Aristotle emphasizes, saying: "Socrates was busying himself about ethical matters neglecting the world of nature as a whole but seeking the universal in these ethical matters." (Aristotle, McKeon 1941, Metaphysics Book 1, line 987)

Socrates provides the deliberative perspective through a creative account of his "mind's eye": Socrates' abstract knowledge - the universal, after Anaximander. In the *Phaedo* dialogue Socrates gives us his universal view:

> In the first place, if the earth is spherical and in the middle of the heavens, it needs neither air nor any other such force to keep it from falling; the uniformity of the heavens and the equilibrium of the earth itself are sufficient to support it. This is the first article of my belief.
>
> We live around the sea like ants or frogs round a pond - and there are many other peoples all round inhabiting similar regions. But the earth itself is as pure as the starry heaven in which it lies, and which is called the *aether* by most of our authorities. The water, the mist, and the air are the dregs of this *aether*.
>
> Although we live in a hollow of the earth, we assume we are living on the surface, and we call the air heaven, as though it were a heaven through which stars move. If someone could reach to the summit, or put on wings and fly aloft, when he put up his head he would see the world above, just as fishes see our world when they put up their heads out of the sea. And if his nature were able to bear the sight, he would recognize that that is the true heaven and the true light and the true earth.
>
> For this earth and its stones and all the regions which we live are marred and corroded, just as in the sea everything is corroded by the brine. The real earth, viewed from above, is supposed to look like one of those balls made of twelve pieces of skin, variegated and marked out in different colours, of which the colours which we know are only limited samples, like the paints which artists use, but there the whole earth is made of such colours and others far brighter and purer still. (Phaedo, lines 108 -114)

Socrates posits our world of everyday sense experience within the "real world", within his enlightened perspective. This is the relationship that Plato develops in the "Allegory of the Cave"; the cave where we dwell and the enlightened real world outside the cave, interestingly much like "a cell within a cell".

This is Socrates' abstracted view of the world from which he develops the noble risk and says: "Of course, no reasonable man ought to insist that the facts are exactly as I have described them" (Phaedo line 114, see section 3.2.1). Indeed, the facts are not as Socrates describes them but only Socrates' most recent abstract images from the race. Socrates says our earth is embedded in *aether*, which seems very much like Thales' water and our atmosphere (see note 3.9). We can develop Socrates' perspective by saying: if the earth were the size of an apple, the *aether* (atmosphere) would be roughly as thick as its skin. Socrates' deliberative perspective can be imagined by looking down at the earth with your eye in the "hole in the ozone layer", the new socket which we have brought into being.

Deliberation refers to thinking about abstracted concepts - things that can be tested by some criteria. The theory of the world has developed but the empirical facts, the sun and the earth, still seem the same. The world may be spherical but it is moving, not still. We posit the theory of gravity to explain the movements. Socrates' hypothesis that a stationary world is in the center of the heavens held in equilibrium has been falsified (see section 3.2.2). But as Dewey (1929) says, "Neither self nor world, neither soul nor nature (in the sense of something isolated and finished in its isolation) is the center, any more than either earth or sun is the absolute center of a single universal and necessary frame of reference" (Dewey 1929, p. 290).

Perhaps Socrates would have enjoyed this change in perspective, that there is no necessary center, that the universe is center-full. Socrates, the poet, is pulling images from the race, creating and advancing theory. He has an eye on the uncertain expectations of the future, but as Nietzsche (1870) suggests, Socrates plumbed all questions like a scientist guided by the thread of causation. Socrates provides a *process of becoming* such that each individual becomes a center, a center of meaning through reflection in the mirror.

A deliberative model has been proposed for healthcare relationships, with the 'double process' of Socrates as the model (Emanuel and Emanuel 1992) and for the most recent approach to risk characterization (NRC 1996). Deliberation forms the basis of the principle of autonomy developed by Kant (see section 2.3). Aristotle, in Book III of the *Nicomechean Ethics*, asks: "Do we deliberate about everything, and is everything a subject of possible deliberation?" (Aristotle, McKeon 1941, p. 969) He argues that we deliberate only about means to ends which we have the power to bring about. Aristotle says:

> The things that are brought about by our own efforts, but not always in the same way, are the things about which we deliberate, e.g. questions of medical treatment; deliberation is concerned with things that happen in a certain way for the most part, but in which the event is obscure, and with things in which it is indeterminate (McKeon, p. 969).

The process of informed consent assumes that health risk communication begins with a discussion of ends (see section 2.5.2). Deliberative autonomy expresses the idea that reason is used while questioning the means to a defined end and is necessary for genuinely autonomous actions (Minogue 1996). Acts follow from reason, through deliberating about consequences involved, but they are not determined by the consequences. For example, in keeping with Kant's "categorical imperative" we ought never act except in such a way that we can also will that the principle of our action should also become a universal law (Kant 1956). It is a reflection of reason, not a reaction to consequences, which describes the motivation for choice. Deliberation refers to choice about means, when the end is defined, and when there is more than one way to the well-defined end.

Further, Aristotle argues that we should not deliberate over things over which we have no control, things that always happen in the same way, like the earth spinning round the sun. This would then include chance events, like a meteorite hitting the earth and wiping us out like the dinosaurs. Thompson (1996) points out that there is an important *nondeliberative* aspect to risk communication and fostering autonomy. Socrates places the question of life after death in the *nondeliberative* realm (see section 3.2.1). The *nondeliberative* aspect enters through the concept of risk itself, as a cognitive gatekeeper between the *deliberative* and *nondeliberative* dimensions of practice.

The primary impetus to switch from the nondeliberative realm to the deliberative realm is the magnitude of the risk number. When a particular course of action is called "risky", it is moved from the nondeliberative realm to the deliberative realm. Thus, risk communication plays the role of helping people reverse processes of thought; that is, from the nondeliberative to the deliberative realm when things are deemed risky, and from the deliberative to the nondeliberative realm when things are no longer considered risky. Helping people with this reversal is fostering autonomy, in so far as such is helping people realize the risks they are confronting.[3]

With the thousands of chemicals in the environment, who can deliberate all the risks? Public health is inherently a weakly paternal practice, and most of the chemical risks remain in the nondeliberative realm for the public, and likely for public health providers or risk managers. Indeed, there are so many risks associated with each act that if we deliberated them all, like the contribution of the insignificant plume of smoke from each of our cars contributing to the greenhouse effect, we would be trapped in endless deliberation, unable to drive. Similarly, Dow Chemical in Fort Saskatchewan suggests their stacks contribute insignificantly to the dioxin load in the environment; they want us to place their stack emissions in the nondeliberative realm (Leiss 1996). But, where is the significant source of dioxins or pesticides that has caused the emergence of a background concentration in virtually everyone's tissue? Where are the significant emissions causing the "greenhouse effect" or "acid rain"? (see section 2.2)

4.5 The *Charmides*: Socrates as a Health Care Provider

The *Charmides* dialogue discusses the virtue of temperence, *sophrosyne*, and begins the "double process" for health care decision-making described by Plato (Laws IV line 720c), the current deliberative model (Emanuel and Emanuel 1992) and the fostering autonomy model (see section 2.6.3). As we have discussed previously for health care, in medicine the person first perceives their own illness and seeks the healthcare provider, whereas in public health, the healthcare provider perceives and seeks the public (Howell 1996, see section 1.1). The healthcare providers and public form the unified whole in the relationship; the two go together. The *Charmides* illustrates the method in a health care context. I will trace the first part of the dialogue as it reveals the ethical attitude of Socrates by contrasting Zalmoxian with Greek Medicine, illustrating the importance of fostering autonomy.

Socrates claims in the *Charmides* that "he learned" from a healthcare provider of the Thracian King Zalmoxi the fundamental principle of treatment of the whole and the part together. However, Socrates' discussion of natural science in the *Phaedo* does not refer to Zalmoxi at all, and only to Anaxagoras by name:

> This Thracian told me that the Greek physicians are quite right as far as they go, but Zalmoxis says further, "that as you ought not to attempt to cure the eyes without the head, or the head without the body, so neither ought you to attempt to cure the body without the soul. And this, he said, is the reason why the cure of many diseases is unknown to the physicians of Hellas, because they disregard the whole, which ought to be studied also, for the part can never be well unless the whole is well.
>
> For all good and evil, whether in the body or in the whole man, originates, as he declared, in the soul, and overflows from thence, as if from the head into the eyes. And therefore, if the head and body are to be well, you must begin by curing the soul - that is the first and essential thing. And the cure of the soul, my dear youth, has to be affected by the use of certain charms, and these charms are fair words, and by them temperance is implanted in the soul, and where temperence comes and stays, there health is speedily imparted, not only to the head, but to the whole body. And when he taught me the cure and the charm he added, Let no one persuade you to cure his head, until he has first given you his soul to be cured by the charm. For this he added, is the greatest error in our day in the treatment of human beings, that men try to be physicians of health and temperence separately. (Charmides line 156e-157)[4]

Hippocrates is presented as following the same principle expressed in this passage; that one cannot understand the nature of the part without taking into account the whole (Phaedrus, line 270c) (see section 3.1).

Heidel (1941) argues that Plato's reference to Hippocrates is significant and means that he is in agreement with Socrates on this fundamental tenet. However, Heidel does not discuss the clear critique of Greek medicine presented in the *Charmides*, "the greatest error in our day" and that the physicians of Hellas assume they know the whole. As discussed previously (see section 2.3), the *Decorum*, in the Hippocratic corpus, advocates "concealing most things from the patient" and "revealing nothing of the patient's future or present" (Jones 1992). Following the *Decorum* breaks Socrates' conception of medicine and introduces paternalism; it assumes knowledge of the whole. Jones (1992) argues that the *Decorum* does not date back to Hippocrates and that no ancient author mentions the text. Therefore, if Heidel is correct in Plato's references to Hippocrates we need to ask: Does Hippocrates belong in the Hippocratic tradition? This will be taken up again in section 4.4.

Coolidge (1993) argues that if Zalmoxian medicine is possible, "its care in relation to the whole must begin with a care concerned with what the whole is that arises out of ignorance of the whole." Zalmoxi medicine requires Socrates' basic philosophical standpoint (Apology line 21d); Socrates knows that he is ignorant. What he does not know he does not suppose he knows and thus he engages with the person to understand the whole. Further, in Socrates' method of inquiry, communication, questioning and dialogue, he always says his arguments in a manner appropriate to the conditions of psyche or soul of the person with whom he talks. This basic educational practice of Socrates is required in Zalmoxi medicine.

Socrates says he must "keep his oath" and apply the charm for "temperence". In Greek, the word is *sophrosyne*, not temperence (see note 3.7). Problematically, there is no translation into English and this is the central difficulty with the dialogue. The word means "nothing in excess" and was the spirit behind the Delphic saying "know thyself" as Critias suggests (Charmides line 164d). Kierkegaard regards "know thyself" as meaning the development of inwardness, subjectivity, the end of Socrates' questioning in the "process of becoming" (Nagley 1980, Sarf 1983). Nietzsche (1871) says that *sophrosyne* derives from the Greek god Apollo, referring to spiritual calm and observance of the limits of the individual. Apollo demands self-control which demands a knowledge of self. Further, he claims that Socrates believed *sophrosyne* is ultimately derived from the dialectic of knowledge and therefore is teachable.

Foucault (1988) says to take care of oneself is the task of "knowing oneself", but that "know thyself" has obscured the idea of "care for oneself". Taking care of oneself was a principle, but more importantly a constant practice from which "know oneself" developed. Foucault describes how to care for oneself is a daily practice carried out by developing a narrative with oneself through meditation and writing, a creative exercise in developing a personal history. Coolidge (1993) claims *sophrosyne* is the presence in psyche of what is required for the restoration of health in body, that recovery from illness presupposes a certain degree of self-control. *Sophrosyne* can be related to the Greek concept of measure, to keep in proper ratio or balance.[4]

Coolidge (1993) discusses the point that if the Thracian doctor means that the soul is the source of "all disease", then all disease is psychosomatic! If so, why the need for drugs for the headache? It is doubtful that the text means the soul is considered the only source of all disease. Socrates' "metaphor of the plant" means that health of the organism is related to the potential for growth in an environment, and thus both the organism and environment contribute to health and disease (see section 3.3.2). Disease cannot be reduced completely to soul or environment.[5] Thus, the point is to engage the psyche or soul of the person and possibly to start it "overflowing" positively. Without diverging or claiming deep knowledge of this area, this perspective, especially in relation to hope, is gaining recognition in health care and may come to define the role of health risk communication (Bursztajn et al. 1981, Moyers 1993, Everson et al. 1996, Johnson and Roberts 1996, Anda et al. 1993).

The questioning relates back to the fundamental principle above: the soul is the source of good and evil, and overflows into the body.[5] Socrates needs to enquire into the soul of Charmides, whether it is flowing good or evil. If Charmides has *sophrosyne*, he does not need the charm, and if he does not have *sophrosyne*, Socrates needs to apply the charm. At this point, Critias, Charmides' uncle, insists that Charmides already has temperence, and therefore does not need the charm.

Socrates tells Charmides, in a rare profession, that "he knows" a cure for headaches, a leaf or natural drug and a certain charm. Charmides replies that he will write out the charm. However, Socrates replies: "With my consent or without my consent?" (Charmides line 156). Socrates insists that before Charmides writes out the charm, he must receive his (Socrates') consent. This is an important twist on informed consent (see section 2.5). Socrates insists that Charmides understand the purpose of the charm and insists that he determines whether Charmides needs the charm. Socrates' approach toward relationships illustrates the point of distinction from "our" paternalistic Hippocratic tradition:

> I think you and I ought together to inquire whether you have this quality about which I am asking or not, and then you will not be compelled to say what you do not like (to praise himself or call Critias a liar); neither shall I rashly have recourse to medicine (Charmides line 158e).

The paternal provider, following the *Decorum*, would assume that he knows. He would not enquire together with Charmides (see section 2.6.1). The provider who promotes stand-alone autonomy would treat Charmides simply because Charmides is there and willing (see section 2.6.2). Socrates, in elliciting Charmides' opinions, is trying to discover how to care for Charmides as a whole as he knows he is ignorant of the whole. Thus he wants Charmides to go along with him in dialogue: this is the double process, fostering autonomy (see section 2.6.3).

Socrates initiates a dialogue in typical form saying: "If temperance abides in you, you must have an opinion about her", and in Popperian terms says: "form a conjecture whether you have temperance" (Charmides line 159). Through his questioning, he has Charmides "think for himself" and involves him in a "process of becoming".

After several "conjectures and refutations", ideas serving as hypotheses to be tested in the dialogue, Charmides offers up a notion which he heard from someone else:

> I have just remembered that I heard from someone, Temperence is doing our own business. Please consider whether he was right who affirmed that.
>
> "You wicked boy, this is what Critias or some other philosopher has told you", says Socrates.

Socrates scolds Charmides because he has repeated something of which he does not know the meaning. Socrates wants to know what Charmides thinks and keep the oath to the Thracian. He does not want to make the same mistake as Greek medicine by treating the part and not the whole.

The *Charmides* dialogue also has an interesting similarity to a tenet of the Hippocratic medical oath: "I will not abuse my position to indulge in sexual contacts." Socrates when he first sees Charmides, says: "I caught sight of the inwards of his garment and took the flame" and says he thought of the warning of Cydias, 'not to bring the fawn in the sight of the lion to be devoured by him', for I felt that I had been overcome by a sort of wild-beast appetite" (Charmides 155e). After talking with Charmides, Socrates says he regained his confidence and his natural heat returned. Socrates does not devour Charmides. Socrates is temperate. Likewise, Xenophon (1990) argues in the *Dinner-Party* that although Socrates did feel attracted towards his students, he abstained from sexual relations and exercised self-control.

Aside from the model for healthcare relationships, how does this dialogue help with health advisories? The lesson of Zalmoxi medicine can guide health risk communication as the text implies that in the promulgation of health advisories a person-specific approach is required, one that engages the psyche of each individual, one that meets the needs of the specific individual. How can we do this?

We must begin by finding out the psyche of the people, through dialogue, engaging within the community. We cannot assume that we know what will engage the psyche such that it flows positively, that we know what people need to hear such that we can simply post a sign: "Eat 10 grams of fish a month and everything will be OK". Consider the health risk communication of tobacco, alcohol and toxins in fish detailed in Chapter 3. What is the purpose of health risk communication?

Coolidge (1993) points out that in the case of smoking, health risk communication should focus on the psyche, looking to the conditions which foster addiction. Coolidge argues that any cure of only physiological conditions will not suffice to prevent the person from smoking. Perhaps the fostering of *sophrosyne* is precisely what is required. None of the health advisories on tobacco products address this issue. The messages are predominantly technical statements about the potential physiological effects, grounded in statistical and empirical observation, assumingly "scientifically neutral". But are they really so neutral? Are they not trying to scare people from taking up the habit - those targeted by tobacco advertising - the teenagers? Are they backhand attempts to stop people from smoking - through feeling irrational, through fear of disease? Are they intended to cause shame for affecting others from environmental smoke, in particular children, or worse, the life in the womb? If health advisories reflected the needs of smokers trying to quit, generated by smokers, after Socrates' practice - What would the health advisory look like then: "Smoking Kills" or "If you are having a nicotine craving call us at 1-800-BLA-BLAH - we'll help talk you down"?

Recall that Socrates says that he “knows” the cure for headaches, a certain drug and a charm. However, in the end, he can't determine if Charmides needs the charm. And, rather than treat Charmides rashly, Socrates hangs his head saying "examine yourself and see if you can do without the charm, I would rather advise you to regard me simply as a fool who is never able to reason anything out" (Charmides line 175e). Socrates does not treat Charmides rashly, like a merchant of charms.

4.6 The *Protagoras*: Risk, Relationships and Fostering Autonomy

The *Protagoras* dialogue provides us with a sophisticated concept of risk and risk communication. Socrates' affective attitude towards people and relationships is revealed in two relationships: Hippocrates the boy and Protagoras. Interestingly, Socrates fosters the autonomy of Hippocrates, a young boy, who has been named after Hippocrates of Cos, the doctor. Hippocrates the boy wants to study with Protagoras, the famous Sophist, and asks Socrates to persuade Protagoras to teach him. To this Socrates replies: "He is a sophist, and you can persuade him with money." In contrast, Socrates would not take money for his educational counsel (Apology line 33), and indeed does not charge Hippocrates the boy for the lessons he receives from him.

Socrates also engages with Protagoras, which shows Protagoras' ethical attitude. From this dialogue we can obtain some insight into the root of our ethical health risk communication needs. What does Protagoras claim to teach that has Socrates so concerned for the welfare of Hippocrates the boy? Is it simply that Protagoras is a sophist? Has Plato included Hippocrates the boy for a reason, challenging the sophistry associated with Hippocrates of Cos' name? Does this dialogue provide us with the source of our ethical problems that has resulted in the recent intense bioethics scholarship, when the Hippocratic tradition began being challenged in the 1960s (see Introduction and section 2.3, Pellegrino 1993, Laine and Davidoff 1996)?

This section will be divided into three subsections. Section 4.6.1 presents the relationship between Socrates and Hippocrates the boy. The important exchange between Hippocrates and Socrates is presented where the concepts of risk and fostering autonomy are dealt with. Section 4.6.2 will discuss the relationship and dialogue between Socrates and Protagoras. The last section 4.6.3 presents a current conception of the healthcare relationship based on the concepts presented in the two previous sections with Pellegrino's (1985) conception of the relationship.

4.6.1 Socrates and Hippocrates the boy: Risk and Fostering Autonomy

(*Protagoras* dialogue beginning at line 311b)

> Socrates: Tell me this Hippocrates, is it your present intention to go to Protagoras and pay him money as a fee on your behalf. Now whom do you think you are going to and what will he make of you? Suppose for instance you had it in mind to go to "your namesake Hippocrates of Cos", the doctor, and pay him a fee on your own behalf, and someone asked you in what capacity you thought of Hippocrates with the intention of paying him, what would you answer?
>
> Hippocrates: I should say, in his capacity as a doctor.
>
> Socrates: And what would you hope to become?
>
> Hippocrates: A doctor.
>
> Socrates: What particular name do we hear attached to Protagoras in the sort of way that Phidias is called a sculptor and Homer a poet?
>
> Hippocrates: Well Sophist, I suppose Socrates, is the name generally given to him.
>
> Socrates: Then it is as a Sophist that we will go to him and pay him?
>
> Hippocrates: Yes.
>
> Socrates: And what do you hope to become by your association with Protagoras?
>
> Hippocrates: (He blushed at this, betraying himself) If this case is like the other cases, I must say to become a Sophist.
>
> Socrates: But wouldn't a man like you be ashamed to face your fellow countrymen as a Sophist?
>
> Hippocrates: If I am to speak my real mind, I certainly should.
>
> Socrates: Perhaps this is not the kind of instruction that you expect to get from Protagoras, but rather the kind you got from schoolmasters who taught you letters, gymnastics and music. You did not learn these for professional purposes, to become a practitioner, but in the way of liberal education, as a layman and a gentleman.

Hippocrates: That exactly describes the sort of instruction I expect from Protagoras.

Socrates: On what subject does the Sophist make clever speakers?

Hippocrates: Obviously on the subject of which he imports knowledge.

Socrates: Very probably. And what is the subject on which the Sophist is both an expert himself and can make his pupil an expert?

Hippocrates: I give up. I can't tell you.

Socrates: Well, then, do you realize the sort of danger to which you are going to expose your mind? If it were a case of putting your body into the hands of someone and risking treatment's turning out beneficial or the reverse, you would ponder deeply whether to entrust it to him or not, and would spend many days over the question, calling on the counsel of your friends and relations.

But when it comes to something which you value more highly than your body, namely your mind - something on whose beneficial or harmful treatment your whole welfare depends - you have not consulted either your father or your brother or any of us who are your friends on the question whether or not to entrust your mind to this stranger who has arrived among us.

On the contrary having heard the news in the evening, so you tell me, here you come at dawn, not to discuss or consult me on this question of whether to entrust yourself to Protagoras, but ready to spend both your own money and that of your friends as if you had already made up your mind that you must at all costs associate with this man - whom you say you do not know and have never spoken to, but call a Sophist, and then to turn out not to know what a Sophist is though you intend to put yourself into his hands.

Hippocrates: It looks like it, Socrates from what you say.

Socrates: Can we say then, Hippocrates, that a Sophist is really a merchant or peddler of the goods by which the mind is nourished? To me he appears to be something like that.

Hippocrates: But what is it that nourishes the mind?

Socrates: What it learns, presumably. We must see that the Sophist in commending his wares does not deceive us, like the wholesaler and the

> retailer who deal in food for the body. These people do not know themselves which of the wares they offer is good or bad for the body, but in selling them they praise all alike, and those who buy from them don't know either, unless one of them happens to be a trainer or a doctor.
>
> So too those who take the various subjects of knowledge from city to city, and offer them for sale retail to whoever wants them, commend everything that they have for sale. But it may be, my dear Hippocrates, that some of these men also are ignorant of the beneficial or harmful effects on the soul of what they have for sale, and so too are those who buy from them.
>
> If then you chance to be an expert in discerning which of them is good and bad, it is safe for you to buy knowledge from Protagoras or anyone else. But if not, take care you don't find yourself gambling dangerously with all of you that is dearest to you.
>
> Indeed the risk you run in purchasing knowledge is much greater than that in buying provisions. When you buy food and drink, you can carry it away from the shop or warehouse in a receptacle, and before you receive it into your body by eating or drinking you can store it away at home and take the advice of an expert as to what you should eat and drink and what not, and how much you should consume and when; so there is not much risk in the actual purchase.
>
> But knowledge cannot be taken away in a parcel. When you have paid for it you must receive it straight into the mind. You go away having learned it and are benefitted or harmed accordingly.
>
> So I suggest we give this matter some thought, not only by ourselves, but also with those who are older than we, for we are still rather young to examine such a larger problem. However, let us carry out our plan to go and hear the man, and when we have heard him we can bring others into our consultations also, for Protagoras is not here by himself. There is Hippias of Elias, and I think Prodicus of Ceos too, and many other wise men.

Socrates' involvement with Hippocrates is important because it reveals two aspects of an ethical healthcare relationship. First, Socrates goes with Hippocrates to meet Protagoras, but not for his own sake; he means to promote the good of Hippocrates (principle of beneficence) and prevent harm that Protagoras may cause to Hippocrates (the principle of non-maleficence). The dialogue provides an example of the application of ethical principles in a relational ethics context.

Second, the involvement of Socrates forces Protagoras to prove that he is a worthy teacher, rather than Hippocrates proving that he is a worthy student (Benitez 1992). Thus, Socrates makes Protagoras show that he is there for Hippocrates' benefit and therefore must have genuine dialogue with Hippocrates. These two lessons are of key value in our present health care or health risk communication circumstances. Our problem is how to ensure that the perspectives of healthcare providers are "for the other".

Socrates uses a comparative risk approach to help Hippocrates understand the seriousness of his quest and to understand that he is gambling dangerously with his health. Socrates contrasts the health risk from fruits and vegetables (care of the body) with risks from receiving information and knowledge (care of the soul). Socrates argues that the risks from receiving inferior knowledge are far more serious. This is a concern for Hippocrates' autonomy. Indeed, Socrates describes his mission in the *Apology* as the caring for people's souls, perfecting them such that they can examine their lives, such that they can seek the "good". This stems from Socrates' belief that "life without this sort of examination is not worth living" (Apology line 38). The risk is that poor knowledge prevents this life, the ability to reason.

Socrates is trying to warn Hippocrates the boy of the risk he runs in accepting Protagoras' teachings uncritically. This is analogous to Hague's and Douglas' comments in 1930s, that we should be careful we do not communicate nonsense, or propaganda, as there is much misinformation about health subjects (see section 1.5.2).

Socrates at the end of the passage suggests to Hippocrates that after they have heard Protagoras they should seek the counsel of others who may be older and wiser. Socrates suggests to Hippocrates that they ground their doubts in relationship and not only in their own mind. Socrates' experience and perception serve as the basis for the development of ideas. These ideas generated through experience serve as hypotheses to be tested in dialogue through refutation. Indeed, this is where risk enters; our ideas are uncertain concepts. Socrates seeks the other because he wants to be refuted, test his own mind, and this forms the basis of scientific enquiry (see section 3.2.2). This is the purpose of Socrates' promotion of second opinion, telling Hippocrates to deliberate with family and friends.

Public health providers, in following Socrates, should ground their perceptions in the public and not in their own minds. Thus, risk communication should facilitate grounding awareness of public health risk through relationship with the public. Consider the tobacco risk communication: If public health providers grounded their perceptions of cancer and tobacco smoke from the 1930s in the public, perhaps the tremendous number of cancer deaths that have occurred over this century could have been prevented. Indeed, this aspect of risk communication is related to the concept of '*chess advisories*' introduced in Chapter 3.

In modern times, Leiss (1996) describes the risk comparative method used here by Socrates as the message of permanent value from the "first phase of risk communication" (1975-1984). Leiss says: "For individuals and societies, managing opportunities and dangers on the basis of comparative risk information is an inescapable duty" (Leiss 1996, p. 88). Indeed, one of Socrates' great contributions is his method of fostering intelligent practice and life.

Bursztajn et al. (1981) argue that healthcare providers must teach and learn to gamble consciously, as opposed to the unconscious gambling of Hippocrates. Risk belongs to the language of gambling and refers to what we do (Bauman 1993). Conscious gambling involves being critically aware that we are gambling, not having blind-faith or trust. This is the awareness that Socrates gives Hippocrates the boy, not to approach Protagoras with blind-trust.

The problem of receiving fragmented knowledge, and bad instruction in particular, has been raised as a key problem in genetic counseling, and often results from the multireferral of professionals - receiving bits and pieces of information as one moves through healthcare professionals or risk communicators (Kessler 1979, Reisman and Matheny 1969, Bursztajn et al. 1981). Counseling must consist of a process of deconstruction and reconstruction of knowledge during the counseling process. Because scientific knowledge is continually changing and reflects the current state of affairs, the process of deconstruction and reconstruction describes the movement of our thought in science generally, from paradigm to paradigm.

Counseling must integrate the new information with previous existing information held by the person. The counselor has to unwind and sort out the entangled conceptions of previously gained information and sometimes face the unpleasant task of trying to undo wrong information and bad advice. Consider the great accomplishment of public health providers in helping people become aware of the risk of tobacco smoke after a century of silence and promotion (see section 3.6). Consider what we have learned from the "hole in the ozone layer", the separation in distance and time of causes and effects, that what appears as good advice sometimes turns out to be bad (see section 2.2). Socrates' advice to the young Hippocrates is very pertinent and still applies.

4.6.2 Socrates and Protagoras: The Ethical Risk Communicators

What does Protagoras claim to teach that should make Socrates so concerned about Hippocrates the boy? Protagoras claims to teach people how to be good, how to be better. This is the same task which Socrates describes for himself in the *Apology* (see section 4.1). Socrates is concerned because Protagoras claims to teach virtue. The central questioning of the dialogue investigates what virtue is, and then, whether it is possible to teach virtue. The investigation requires that Protagoras gives an account of his teaching, his own virtue, to Socrates and Hippocrates the boy (see section 4.7.2).

Protagoras describes most Sophists as existing behind a "mask", disguising themselves with the cover of the arts and technical skills so that people cannot see who they really are. The mask is "a screen to escape malice" (Protagoras line 317). In contrast, Protagoras says he goes the opposite way. He tells everyone he is a sophist and an educator, but he is willing to meet the other "face to face". Protagoras wants to discuss everything openly, much like Socrates. Bauman (1993) suggests meeting the other "face to face" means that the meeting is not dependent on the other's past, present, or any anticipated future reciprocation, and that morality is the nature of the encounter (Bauman 1993, p. 48). Existing behind the mask thwarts self-examination.

Socrates engages to learn and does not posit a static truth. The crux of the matter is that the roles of master and pupil are reversible in Socrates' relationship: Socrates and student leading each other on, like signs pointing the way. As Bauman says (1993), the dialogical relationship of Buber (see section 4.4.2 above) has an "address response structure, a structure of on going conversation, in the course of which the partners incessantly exchange roles" (Bauman 1993, p. 49). This model for enquiry and relationships is explicitly stated by Socrates to Protagoras, after Protagoras "feels shame", much like Hippocrates the boy after admitting he must expect to become a Sophist (see section 4.6.1), for not answering Socrates' questions:

> Protagoras, please don't think that I have any other purpose in this discussion than to investigate questions which continually baffle me. I believe Homer hit a nail on the head when he said, "If two go together, one perceives before the other". Somehow we all feel better fortified in this way for any action or speech or thought. But to continue the quotation, "If one alone perceive" - why he goes off at once looking for someone to whom he can show his idea and with whom he can confirm it, and will not rest till he finds him. (Protagoras, line 348d)

Socrates also references this method in the *Phaedo*, saying: "It is our task to come to close quarters in the Homeric manner and test the validity of your contention" (Phaedo line 95b). This passage shows us that Socrates and Protagoras are capable of shame because they meet face to face (see note 9 below), that they ground their doubts in relationship not in their own minds, and follow the method of science, positing their ideas to be refuted by the other. Shame is associated with reputation, and in Greek culture, public image was of paramount importance. Socrates questions the Sophists to remove their "masks", revealing the hidden truth of their profession. Socrates' questioning silences the Sophists through their fear of risking shame, fear of an evil reputation.

Protagoras claims he will not treat Hippocrates the boy like most Sophists, who treat their pupils badly. Protagoras says he will teach Hippocrates the boy to care over his own personal affairs and the affairs of the state, he will not thrust him back into specialty studies as most Sophists. Protagoras distinguishes himself from the general characteristics of Sophistry. Protagoras appears virtuous. Socrates does not challenge Protagoras on these assertions and they turn to the investigation of the meaning of virtue.

Socrates begins the dialogue by claiming that virtue is not teachable and says:

> If the state is faced with some building project, I observe that it is architects are sent for and consulted about the proposed structures, and when it is a matter of shipbuilding, the naval designers, and so on with everything which the Assembly regards as a subject of learning and teaching. If anyone else tries to give advice, rich or poor, whom they do not consider an expert, the members reject him noisely and with contempt, until either he is dragged off or ejected by the police on orders from the magistrate. That is how they behave over subjects that are technical.
>
> But when it is something about the government or the country that is debated, that man that gets to advise them is a blacksmith or a shoemaker, merchant or shipowner, rich or poor. No one brings it up in these cases, as against those I have just mentioned, that there is a man who without any technical qualifications, unable to point to anybody as his teacher, is yet trying to give advice. The reason must be that they do not think this is a subject that can be taught. (Protagoras line 319b)

Socrates argues that "virtue cannot be taught", and thus Protagoras must refute this claim. How can Protagoras claim that virtue can be taught?

Protagoras argues first by discussing the myth, "Prometheus Bound". The myth says that the virtues are implicit in human beings, part of human nature, but that the virtues are not expressed innately or automatically. Protagoras says that: "Everyone knows that it is nature or chance which gives the characteristics to a human being, both the good and the bad. But it is the good qualities that are thought to be acquired through care and practice and instruction" (Protagoras line 323d).

In contrast to Socrates' argument in this dialogue, Protagoras asserts there are a few things that all men must share for human beings to exist as communities: justice; temperance; holiness; wisdom; courage. Or to concentrate these into a single whole: virtue (Protagoras line 325). Virtue is not an expert or technical skill, like shipbuilding, forging and pottery, but must enter every practice or occupation.

Protagoras' argument is implicit in Socrates' dream of the ideal approach to risk management (Charmides line 173b) (see section 3.2.3). Protagoras turns Socrates' own argument that virtue cannot be taught in refuting him. In questions of political wisdom or in government or matters of the country, everyone is consulted as these questions follow the path of justice and moderation of which everyone has a share. Whereas in questions of technical tasks, experts are consulted because they have been trained for the particular craft. Indeed, this is a central question for risk management and communication today: Are risk questions, the science of the future, technical tasks, or a task for democracy? (see section 1.2 and 1.5.4). Implicit in Protagoras' and Socrates' theory is that "everyone is an ethicist". The basic premise of Socrates' *process of becoming* is that a person can develop inwardness, or perhaps, has a share in virtue.

Socrates and Protagoras then inquire into the relationship of the five virtues Protagoras names: justice, temperance, holiness, wisdom and courage. Intuitively, Socrates and Protagoras want to define virtue as a unity. Socrates says that wisdom, justice, temperance, holiness and courage are five terms, and asks: Do they stand for a single reality? Or does each have a particular reality underlying it, a reality with its own separate function, each different from the other (Protagoras 359c)? The virtues cannot be explicitly defined independently from each other, and the virtues are seen as parts, independent and many, not concentrated as one. Socrates' restatement of Protagoras' claims (line 329e, 331d, 333) act as a point of consensus:

> Each of the terms applies to its own separate reality, and that all these things are parts of virtue, not like the parts of a lump of gold all homogenous with each other and with the whole of which they are parts, but like the parts of the face, resembling neither the whole nor each other and each having a separate function. (Protagoras line 349c)

Likewise, in the *Laches* dialogue, Socrates also says: "do you agree with me about the parts. For I say that justice, temperance, and the like are all of them parts of virtue as well as courage" (Laches line 198b). Knowing the relations of the parts of virtue is a basic quest in life for Socrates. Socrates and perhaps Protagoras see the virtues as part of human nature and thus ethical values as a constant, or virtue as a universal (Copleston 1962). However, they never solve this problem.[6]

What is virtue? The central problem is that in attempts to define a specific virtue, like courage, the other virtues creep in on the definition, in particular for Socrates, wisdom. Interestingly for us, Protagoras wants to argue that the virtue of courage, the virtue in the face of risks, stands out among the others (Protagoras line 349d). Indeed, this is a central question in several of Plato's dialogues.

In the face of the unknown future, how do we risk virtuously? In section 3.2.3, we claimed that Socrates' dilemma is that he has not found a science of the past, present, and future, the knowledge of good and evil. In the face of a risky uncertain future, the problem facing Socrates is: When is a person courageous and when are they a coward? In the *Apology*, Socrates speaks of his courage and risk perception:

> It would be a shocking inconsistency on my part, if, when the officers whom you chose to command me assigned me my position at Potidaea and Amphipolis and Delium, I remained at my post like anyone else and faced death, and yet afterward, when God appointed me, as I supposed and believed, to the duty of leading the philosophical life, examining myself and others, I were then through fear of death or of any other danger, to desert my post. Then I might really with justice be summoned into court (Apology line 28e).

The problem with courage is described in the *Phaedo*, when Socrates says: "The allegory which the mystics tell us - that we men are put in a sort of guard post, from which one must not release oneself and run away - seems to me to be a high doctrine with difficult implications" (Phaedo line 62b). Likewise in the *Laches* dialogue, the virtue of courage becomes inseparable from wisdom, as Socrates says: "I cannot say that every kind of endurance is to be deemed courage. Would you say wise endurance is good and noble? Would you say that foolish endurance, on the other hand, is to be regarded as evil and hurtful?" (Laches line 192c). In the *Protagoras* dialogue, courage also becomes inseparable from wisdom. Socrates says: "Have you ever seen men with no understanding of any of these dangerous occupations who yet plunge into them with confidence? Does not their confidence involve courage too?" To which Protagoras replies: "No, for if so, courage would be something to be ashamed of" (Protagoras line 350b). Problematically, wise endurance with skill does not show courage either, because the person had knowledge that there was nothing to fear.

Have Protagoras and Socrates captured our current risk dilemma? Is the task of risk communication teaching the virtue of courage in facing risks: the contaminants in fish, tobacco smoke, alcohol, global warming, and acid rain? When should we be afraid of these risks? When should we run away? Does risking require courage and wisdom: the courage to face the risks, whether or not we run or stay, the wisdom to deliberate the risky situation, and then, the courage to take the leap?

To answer these questions, Socrates suggests we need "a science of measurement" (Protagoras line 357) or perhaps in modern terms, "risk assessment". However, measurement is ratio, it is not an external standard (see section 4.2). Socrates wants good measure, *sophrosyne*, proper balance, knowing the relative excess, defect or equality. Is this a new task for our "risk assessment", the calculation of *sophrosyne*?

Unfortunately, Protagoras and Socrates do not come to terms with their questions. They leave each other laughing. They agree that if virtue were knowledge, then it would be teachable, and if it is anything but knowledge then this would make it the least likely to be teachable. Socrates has great respect for Protagoras and says: "If you should be willing, then as I said at the beginning, you are the one with whom I would most gladly share the inquiry" (Protagoras line 361d).

4.6.3 Plato and Pellegrino: Towards a New Relationship

Pellegrino (1993) suggests that bioethics discussion has been intense since the early 1960s when the Hippocratic ethical tradition was first challenged. This suggests that we have inherited an historically wrong tradition. But what is really wrong with Hippocrates of Cos? The need for an evaluation of ethics does not necessarily lie with Hippocrates of Cos, as may have been presumed, but with particular problems associated with Sophistry. Indeed, much like Socrates' comments about sophists to Hippocrates the boy, Bates in 1936 (see section 1.5) suggests that we are all aware of the charlatan who desires to sell his wares and, unquestionably, this has done a great deal of harm (Bates 1936). In more recent times, Bates (1994) says: "At its worst, it (risk communication) is viewed as biased education by a highly partisan group of interests." This suggests that the long tradition that has survived to our times developed from a "sophist" or "expert tradition". Thus we should consider restoring Hippocrates of Cos' name, a founder of public health practice after Socrates.[7] Perhaps we have only rediscovered the same need for ethics in public health and health care 'risk communication' that existed in Greek times.

With the distinctions elaborated we can recast the healthcare relationship based in care after Socrates. Pellegrino (1985) describes the healthcare provider as making a promise to persons seeking health care when they enter into a healing relationship; the promise comes from the offer of help. Pellegrino argues that the healthcare relationship is based in profession and trust and, like Socrates, not a commercial venture of mutual self-interest, nor a legal venture based on technicalities of contract. The offer of help contains two promises: (1) competency and knowledge in healing, and (2) to use that knowledge in the person's interest. The promise creates an expectation about the future, in that the future will be formed in some particular way. Hence, the promise creates social expectations and obligations which the responsible healthcare provider must strive to fulfill.

Pellegrino suggests that healing can be thought of in terms of curing and caring. Curing is the eradication of the cause of disease, or the reversal of the natural history of a disorder. Curing is the scientific outcome of medicine and has entered health care realistically within this century. However, curing is not guaranteed and cannot be applied to chronic diseases. Plato says that in reaching for cures we risk "attaining a most unreliable result with a large element of uncertainty" (Philebus 56a).

Caring has been described as sharing the pain and fear the person experiences, even though one cannot have that identical experience (Bursztajn et al. 1981). But to share the general sense of pain and fear provides the person with some pleasure and security in their relationship with the healthcare provider. The certainty that health care could possibly offer is the security of being, the promise "to be taken care of", and to have the integrity of one's autonomy fostered.

Pellegrino (1985) has elaborated the meaning of care into four senses: (1) having compassion - sharing the experience, (2) doing for others what they cannot do themselves, (3) helping cope with the medical problem by transferring some responsibility to the healthcare provider, and (4) handling the medical problem. Moreover, the means to cure in any case are subsumed by care. To care in the modern sense implies both knowledge of caring for someone and scientific knowledge of the world.

Foucault (1988) describes the history of care, whether for someone else or for oneself, as taking care of oneself and the task of "knowing oneself". Foucault argues that Socrates helped his friends to come to know themselves; thus, fostering autonomy is the practical activity of the "culture of care". This brings us back to Socrates' quest in the *Charmides*: what is *sophrosyne*?

4.7 A Relational Ethics Approach to Risk

In this final section I develop a relational ethics approach to risk that can be applied to public health. The analysis consists of three parts: (1) the concept of risk, (2) the risk advisor and the deliberative concept of risk, and (3) the risk education method.

4.7.1 The *Phaedo*, *Timaeus* and *Laws*: The Existential Root and Biological Model of Risk.

The *Phaedo* dialogue presents the existential root of the concept of risk. Socrates is in jail after his trial, waiting to be executed with hemlock poison when the guards come and release him from the chains holding him. Socrates sits up on the bed, draws up his leg while massaging it, and says:

> What a queer thing it is my friends, this sensation which is popularly called pleasure! It is remarkable how closely it is connected with its opposite, pain. They will never come to a man both at once, but if you pursue one of them and catch it, you are nearly always compelled to have the other as well; they are like two bodies attached to the same head or stem.
>
> I am sure if Aesop had thought of it he would have made a fable about them, something like this - God wanted to stop their continual quarreling, and when he found that it was impossible, he fastened their heads together; so wherever one of them appears, the other is sure to follow after. That is exactly what seems to be happening to me. I had a pain in my leg from the fetter, and now I feel the pleasure coming that follows. (Phaedo, line 60c)

Socrates uses a metaphor developed from literature in creating his personal narrative, in this case the experience of pain and pleasure.[8] This perspective of pain and pleasure as oppositions attached resembles the perspective of Heraclitus and Anaximander (see note 3.9). Notice in Socrates' account, pain creates an expectation of pleasure and pleasure an expectation of pain. Socrates calls these concrete opposites and they are poles of a continuum.

The idea of risk connected to pain and pleasure is abstracted from Socrates' experience further by Plato through grounding the concept in the physiological model of human beings. Plato says, much like Anaximander, that "God created each thing in relation to itself" and "the universe, a single animal comprehending in itself all other animals" (Timaeus 69c). The change of perspective introduced by Socrates can be understood in reference to Plato's conception of the universe, namely, the resolution of the self within the single organism - the perspective of relative autonomy. In the creation of mortals Plato says: "God gave this task to his offspring, and these gods fashioned a mortal body around the immortal soul, the body was the vehicle of the soul." Within the body, these gods constructed a soul of another nature, which was mortal, subject to terrible and irresistible affections:

> First of all, pleasure, the greatest incitement to evil; then pain, which deters from good; also confidence and fear, the two foolish counselors, anger hard to be appeased, and hope easily led astray - these they mingled with irrational sense and with all-daring love according to necessary laws. (Timaeus, lines 69d)

Plato's conception of the person is a complex of Apollonian and Dionysian elements, the rational and irrational (see section 4.2). Plato describes the two foolish counselors in more detail in the *Laws I*, in terms of the human psychology of individual risk decision-making:

> Athenian: One person has within himself a pair of unwise and conflicting counselors, whose names are pleasure and pain?
>
> Clinias: The fact is as you say.
>
> Athenian: He has, besides, anticipations of the future, and these of two sorts. The common name for both sorts is expectation, the special name for anticipation of fear, and for anticipation of its opposite, confidence. And on top of all is judgement, to discern which of these states is better or worse.
>
> Clinias: I fear I hardly follow you, yet pray proceed with your statement as if I did.
>
> Millegus: I, too, find myself in the same condition.

> Athenian: Let us look at the manner in some light as this. We may imagine that each of us living creatures is a puppet made by gods, possibly as a plaything, or possibly with some more serious purpose. That indeed, is more than we can tell, but one thing is certain. These interior states are, so to say, the cords, or strings, by which we are worked; they are opposed to one another, and pull us with opposite tensions in the direction of opposite actions, and therein lies the division of virtue and vice.
> (Laws I, lines 644c)

The abstract concept of risk develops as expectations of two oppositions: fear and confidence, pleasure and pain.[9] In these terms, fostering autonomy in health risk communication is then the task of interacting with the two foolish counselors within each individual, trying to foster the balance of the two counselors, pain and pleasure, confidence and fear, as appropriate for each particular situation. As Slovic (1992) suggests, risk is inherently subjective. Our difficulty is coming to an agreement with each other on our differing conceptions of risk, overcoming incommensurability. The *Laches* and the Allegory of the Cave develop the concept of risk as deliberative and existential, and the role of the risk educator.

4.7.2 The *Laches* and the *Republic VII* - The Cave: Risk Communication

4.7.2.1 The *Laches*: Risk Advisor

As we saw in the *Protagoras* dialogue, risking means gambling (see section 4.6). The *Laches* dialogue further develops risking as gambling in a variety of contexts. The *Laches* is a search for an advisor or educational consultant and explores the virtue of courage (Buford 1977). The dialogue develops the deliberative concept of risk, much along the lines of current conceptions.

Two fathers, Lysimachus and Melesias, search for a method and teacher to educate their two boys, Aristides and Thucydides, about the virtue of courage through the study of play fighting. The two fathers are concerned because they feel they did not have good teachers themselves, and they want "to take the greatest care of the youths" (Laches, line 179). The two fathers approach two generals of the army, Laches and Nicias, in hopes they will be able to help them, and they decide to approach Socrates. Lysimachus approves of Socrates because the children speak highly of him as a teacher (Laches 180e). Laches says he has seen Socrates' courageous deeds in battle at Delium and thus approves of him because he knows the experience of battle (Laches line 181b). Nicias approves of Socrates because he supplied him with a teacher of music for his own boys, and thus he knows Socrates as an intellectual.

Socrates does not assert himself as a teacher and wants to defer to the two generals, as he says: "I am younger and not so experienced, I will learn what my elders have to say and if I have anything to add, then I may venture to give my advice" (Laches line 181d). Socrates is following the maxim of the midwife, that experience is necessary for knowledge (see section 4.2). Socrates gives two criteria to the fathers in selecting an advisor for the sons: (1) Ask who the generals' good teachers were; were they men of merit and experienced trainers? (2) If they haven't had good teachers themselves, but claim knowledge then ask that they show them the students whom they have improved. Educational consultants who meet Socrates' criteria must harmonize both their deeds and words and they must be able to give an adequate account of their views (Laches 193e) (Buford 1977). They must know the end towards which they are educating the children and show evidence of attaining this end through achievements. If they cannot offer these, Socrates says they should "look for other advisors, as we should not run the risk of spoiling the children of friends" (Laches line 186b). Consider our history of public health risk communication: tobacco, alcohol, and chemical contaminants in fish (chapter 3) in comparison to these words and the ethical *desideria* (see section 1.5). Should the public be looking for new advisors?

The two generals disagree about the education of the boys, leaving no consensus opinion that the two fathers can follow. Lysimachus then asks Socrates to break the deadlock. Socrates is placed at risk by Lysmachus: how can he choose one general over the other without offending either? He reasserts that children are the most cherished, they are the future, and they should not risk their lives trusting their fate to majority opinion. Socrates seeks the welfare of the children, that they should not be placed at risk. Socrates endures in pursuit of courage and says: "We must endure and persevere in the inquiry, and then courage will not laugh at our faintheartedness" (Laches line 194b). Socrates attempts to get both Laches and Nicias to agree to a basic tenet of the discussion, the deliberative concept of risk:

> Socrates: Well then, so far we are agreed. And now let us proceed a step, and try to arrive at a similar agreement about the fearful and hopeful. I do not want you to be thinking one thing and us another. Let me tell you my opinion and, if I am wrong you shall set us right. In our opinion the terrible and the hopeful are the things which do and do not create fear. Fear is not of the present nor of the past, but is of future and expected evil. Do you not agree to that Laches?
>
> Laches: Yes, Socrates, entirely.
>
> Socrates: That is our view, Nicias. The terrible things, as I should say, are the evils which are future, and the hopeful are the good and not-evil things which are future. Do you or do you not agree with me?
>
> Nicias: I agree. (Laches, line 198b)

The deliberative concept of risk developed by Socrates is similar in Aristotle's writings as he also says, in the context of the virtue of courage:

> With regards to feelings of fear and confidence; plainly the things we fear are terrible things, and these are, to speak without qualification, evils; for which reason people even define fear as the expectation of evil. (Aristotle, McKeon 1941, Nichomichean Ethics, line 1115a)

Aristotle defined evil as pain, disgrace, poverty, disease, friendlessness, and death. Notice, Aristotle added death to the list, thinking Socrates to be a fool for not fearing death (see section 3.1 and note 2). Indeed, Socrates' arguments for not fearing death did not ease Aristotle's concern for his own life, his existential dilemma (see section 3.2).

The deliberative concept of risk thus far is along the lines as that developed in the risk literature by Slovic - risk as probability and dread from the spectator's eye.[10] Deliberative risk means reflecting on the expectations of the uncertain future. This concept of risk is also consistent in the *Protagoras* where Socrates defines perception of risk: "Now you recognize the emotion of fear and terror, whether you call it fear or terror, I define it as expectation of evil" (Protagoras line 358d). To which Prodicus insists it is only fear and not terror.

The *Laches* ends inconclusively without an understanding of the virtue of courage. A static universal concept is not proposed. The method of risk education of the children is also not resolved. For the method we must turn to the "Allegory of the Cave" of *Republic VII*. The ethical attitude of Socrates in risk communication relationships is maintained by Plato in the "Allegory of the Cave". Further, in the "Allegory of the Cave" the existential dimension of risk is emphasized in the education - 'risk from the eye on the road'.

4.7.2.2 *Republic VII* - The Allegory of the Cave: Risk Educational Method

The relationship between public health providers and the public, as an educational relationship, is developed through Plato's Allegory of the Cave in *Republic VII*. The *Republic* is considered to represent the ideas of Plato and not Socrates, even though the words are put in Socrates' mouth. However, I argue that Plato maintains the central element of Socrates' ethical attitude. The 'cave' is a metaphor to describe how we are ignorant, or as Bladen (1949) describes, we are "conditioned by our social structure" and Rosen (1960) that our "frame of reference is social in origin" (see section 1.5.4). The cave develops the 'two eyes of Socrates' presented in the *Phaedo* dialogue (see section 4.4):

> Socrates: Compare our nature in respect of education and its lack to such an experience as this. Picture men dwelling in a sort of subterranean cavern with a long entrance open to the light on its entire width. Conceive

them as having their legs and necks fettered from childhood, so that they remain in the same spot, able to look forward only, prevented by the fetters from turning their heads. Picture further the light from a fire burning higher up and a distance behind them, and between them the fire and the prisoners and above them a road along which a low wall has been built, as the exhibitioners of puppet shows have partitions before the men themselves, above which they show puppets.

Glaucon: All that I see.

Socrates: See also, then, men carrying past the wall implements of all kinds rise above the wall, and human images and shapes of animals as well, wrought in stone and wood and every material, some of these bearers presumably speaking and others silent.

Glaucon: A strange image you speak of and strange prisoners.

Socrates: Like to us. For, to begin with, tell me do you think that these men would have seen anything of themselves or of one another except the shadows cast from the fire on the wall of the cave that fronted them?

Glaucon: How could they, if they were compelled to hold their heads unmoved through life?

Socrates: And again, would not the same be true of the objects carried past them?

Glaucon: Surely.

Socrates: If then they were able to talk to one another, do you think that they would suppose that in naming the things that they saw they were naming the passing objects?

Glaucon: Necessarily.

Socrates: And if their prison had an echo from the wall opposite them, when one of the passers-by uttered a sound, do you think that they would suppose anything else than the passing shadow to be the speaker?

Glaucon: By Zeus, I do not.

Socrates: Then in every way such prisoners would deem reality to be nothing else than shadows of artificial objects.

Glaucon: Quite inevitably

Socrates: Consider, then, what would be the manner of the release and healing from these bonds and this folly if in the course of nature something of this sort should happen to them. When one was freed from his fetters and compelled to stand up suddenly and turn his head around and walk and to lift up his eyes to the light, and in doing all this felt pain and, because of the dazzle and glitter of the light, was unable to discern the objects whose shadows he formly saw, what do you suppose would be his answer if someone told him that what he had seen before was all a cheat and an illusion, but that now, being nearer to reality and turned toward real things, he saw more truly? And if also one should point out to him each of the passing objects and constrain him by questions to say what it is, do you not think that he would be at a loss and that he would regard what he formerly saw as more real than the things now pointed out to him?

Glaucon: Far more real.

Socrates: And if he was compelled to look at the light itself, would not that pain his eyes, and would he not turn away and flee to those things which he is able to discern and regard them as in very deed more clear and exact than the objects pointed out?

Glaucon: It is so.

Socrates: And if someone should drag him thence by force up the ascent which is rough and steep, and not let him go before he had drawn him out into the light of the sun, do you not think that he would find it painful to be so haled along, and would chafe at it, and when he came out into the light, that his eyes would be filled with its beams so that he would not be able to see even one of the things that we call real?

Glaucon: Why no, not immediately.

Socrates: Then there would be need of habitation, I take it, to enable him to see the things higher up. And at first he would most easily discern the shadows and, after that, the likeness or reflections in water of men and other things, and later, the things themselves, and from these he would go on to contemplate the appearances in the heavens and heaven itself, more easily by night, looking at the light of the stars and the moon, than by day the sun and the sun's light.

Glaucon: Of course.

Socrates: And consider this also, if such a one should go back down again and take his old place, would he not get his eyes full of darkness, thus suddenly coming out of sunlight?

> Glaucon: He would indeed.
>
> Socrates: Now if he should be required to contend with these perpetual prisoners in evaluating these shadows while his vision was still dim and before his eyes were accustomed to the dark - and this time required habituation would not be very short - would he not provoke laughter, and would it not be said that he returned from the journey aloft with his eyes ruined and that it was not worth while even to attempt the ascent?
>
> Glaucon: They certainly would.
>
> Socrates: But a sensible man, would remember that there are two distinct disturbances of the eyes from two causes, according as the shift is from light to darkness or from darkness to light, and, believing that the same thing happens to the soul too, whenever he saw a soul perturbed and unable to discern something, he would not laugh unthinkingly, but would observe whether coming from a brighter life its vision was obscured by the unfamiliar darkness, or whether the passage from the deeper dark of ignorance into a more luminous world and the greater brightness had dazzled its vision. (Republic VII, lines 514-516b, and 516e-517, 518)

What this beautiful metaphor describes is our basic relationship to reality, how we see when we use our normal senses: eyes, ears, nose and fingers. In Chapter 3, it was argued that scientific theory allows us to perceive, and thus with our theories we escape from the fetters, decipher the objects and the shadows. Socrates suggests the brilliance out of the cave, reality, the experience of the light is analogous to the risk people run when they study the sun directly, that the brightness can really harm the eyes and blind them altogether (Phaedo line 99d) (see section 3.2.2). Socrates says we need theory to approach reality to avoid the risk of blinding our soul. The light is for looking.

The ethical attitude of Socrates is maintained by Plato through the relationship between those who have reached outside the cave, those who have attained Socrates' universal eye, with those who remain fettered:

> Socrates: When they have reached the heights (out of the cave) and taken an adequate view, we must not allow what is now permitted.
>
> Glaucon: What is that?

> Socrates: That they should linger there, and refuse to go down again among those bondsmen and share their labours and honours, whether they are less or of greater worth.
>
> Glaucon: Do you mean to say that we must do them wrong, and compel them to live an inferior life when the better is in their power?
>
> Socrates: You have again forgotten, my friend, that the law is not concerned with the special happiness of any class in the state, but is trying to produce this condition in the city as a whole, harmonizing and adapting the citizens to one another by persuasion and compulsion, requiring them to impart to one another any benefit which they are severally able to bestow upon the community, and that it itself creates such men in the state, not that it may allow each to take what course pleases him, but with a view to using them for the binding together of the commonwealth.
>
> Glaucon: True, I did forget.
>
> Socrates: You have received a better and more complete education than the others, and you are more capable of sharing both ways of life. Down you must go then, each in his turn, to the habitation of the others and accustom yourselves to the observation of obscure things there. For once habituated you will discern them infinitely better than the dwellers there, and you will discern them better than the dwellers there.
>
> And on the women too, Glaucon, for you must not suppose that my words apply to the men more than to all women who arise among them endowed with the requisite qualities. (Remember Phaenarete; my addition) (Republic 519d-520, 540c)

Socrates suggests that once persons have freed themselves from their fetters, escaped the cave to see the truth, the world outside the cave, they must go back down into the cave to help others become free. This was Socrates' basic ethical attitude.

What does it mean to be outside the cave - free? As Dewey (1929) asks, is there an antecedant reality – an unchanging being? Does it mean chained in the cave, but scientifically enlightened with a quantum change in perspective? Socrates' perspective outside the cave has been partially falsified - the earth is not stationary and the necessary centre. Do we ever really escape the cave or simply move from paradigm to paradigm, from cave to cave?[11] We cling to the new abstractions of scientific experience as things in the world, constructing the cave. Can someone else's "objective account" of the world beyond the cave satisfy all your questions - remove all your uncertainty? Will this account make you less concerned about the chemical contaminants? Will this account be contained in a health advisory?

Socrates was concerned with helping people become free of their own fetters, to develop their own answers to these tough questions, the *process of becoming*. Socrates had the 'public health perspective'; his office was the community streets, living down in the cave. Socrates addressed his questions to the psyche of those with whom he was conversing. In the *Phaedo* Socrates says that the "soul is a helpless prisoner, chained hand and foot in the body, compelled to view reality not directly but only through its prison bars, and the imprisonment is ingeniously affected by the prisoner's own active desire" (Phaedo line 83). Socrates, through questioning, helped people see for themselves the images casting shadows on the wall. He refuted their assertions of shadows and led them to see the images casting shadows.

The role of public health providers, following Socrates, is then to help people become free from their fetters, and see the difference between the shadows and the images. It is the responsibility of public health to help people with seeing and to help them answer the tough questions. This requires living in the cave with people. It means experiencing risk and creating the opportunity for shared existential knowing. Public health practitioners need to 'turn to the public', seeking opportunities to have a relationship with people in the community, learning the ways of the community, their understandings of the world and their interpretation of experience. This requires helping people tell their story, create their narrative. This means helping them widen their view of society to factors affecting its welfare. Public health providers "first perceive" and seek the public in the cave in so far as they are enlightened. Indeed, when should we begin seeking the public and how should we help the public come to see?:

> Socrates: Now, all this study of reckoning and geometry and all the preliminary studies are indispensible preparation, for a dialectic must be presented to them while still young, not in the form of compulsory instruction.
>
> Glaucon: Why so?
>
> Socrates: Because a free soul ought not to pursue any study slavishly, for while bodily labours performed under constraint do not harm the body, nothing which is learned under compulsion stays with the mind.
>
> Glaucon: True.
>
> Socrates: Do not, then, my friend, keep children to their studies by compulsion but play. That will also better enable you to discern the natural capacities of each.
>
> Glaucon: There is reason in that.
>
> Socrates: And do you remember, that we also declared that we must conduct the children to war on horseback to be spectators, and wherever it may be safe, bring them to the front and give them a taste of blood as we do whelps?
> (Republic VII line 536d-537)

The last section provides the educational method for risk education and concludes the *Laches* - learning through playfighting. The children need to develop both Socratic eyes: the spectator and the runner (see section 4.3).

Socrates suggests we first take the children as *spectators* to the border, to deliberate the blood through the fearful spectacle, to develop expectations of the future - the risks. Thus we should take people to experience risk, pain and pleasure, fear and confidence, but only when we feel we can safely manage it, i.e., non-maleficently learning through our directed operations. In the *Laches* it was argued that the children are the future, and Socrates is trying to take the greatest care of the youths. Socrates develops both the intellectual side, deliberating the front, and the practical side, experiencing the front. This is in keeping with Socrates' lessons from his mother, Phaenarete the midwife - that it is beyond the power of human nature to achieve skill without experience. This education is coherent with Socrates' maxim in the *Laches* that - action and words need to be in harmony to be virtuous. This brings together the two ethical perspectives that form the basis of relational ethics: the abstract universal and the particular, the distant and close-up (see section 2).

Smith's (1989, 1990) research on risk and the playground offers a unique study to begin developing a concept along the lines presented in the *Laches* and *Republic* for public health. The adult on the playground is in the position of teaching and experiencing risk with children; risk taking and risk averting are the terms at the centre of this relationship. Smith points out that risk must be approached from the perspective of the meaning it has to the particular lives of the children, as the meaning of risk depends upon the way it enters their lives.

Risk taking has significance for the growth and maturation of the child. Through risking, the world is experienced and explored and the child's borders are expanded. When children reach their limitations, feeling safe turns to feeling scared, and they turn back. They are safe within the sphere of what has been discovered and explored, beyond the border is danger, the unknown space they do not explore. On the border there is fear, an expectation of harm, but intermixed on the border is also new discovery. There is thrill on the border. Fear and thrill are in tension. Thus, risk is relative to the particular child, the child's border. The responsible adult on the playground takes children beyond their borders, motivates the children to push their borders by exploring with them, to increase their parameters, as safety is related to being within a known sphere of experience.

Similarly, Wilde's (1994) risk homeostasis theory argues that risk is relative to the person. Wilde's theory maintains that "in any activity, people accept a certain level of subjectively estimated risk to their health, safety, and other things of value, in exchange for benefits they hope to receive from that activity" (Wilde 1994, p, 5). The "race car driver" has explored the borders to a greater extent than most of us, takes greater risks and, is involved in more accidents on city streets, "likely attributed to a greater than average acceptance of risk" (Wilde 1994, p. 90).

Kessler (1992) points out that in genetic counseling, "counselees with relatively higher risks tended to show a proportionately greater change of intentions after counseling than counselees with lower risks. The change was in the direction of more - not less children" (Kessler 1992, p. 4). Kessler speculates that counseling had the impact of reducing anxieties, fears about genetic risks, as both the low and high risk groups expressed a greater desire for a pregnancy after counseling. But does counseling always increase the sphere of feeling safe?

Bursztajn et al. (1981) describe risk communication with people as the narrative of shared decision-making, risking together as conscious gamblers exploring the boundaries that determine trust. They point out that paternalism demands blind trust and often turns into blind mistrust in healthcare providers. They suggest that trust is created through the sharing, through spending time risking together, creating and exploring the borders.

Smith (1989) says the responsibility of the adult is two fold: to make sure that children do not fall off the slide, a responsibility for safety, but also a responsibility to help the child onto the slide, onto steeper slides, to take risks, to gain the experience. The responsibility is in developing wisdom and confidence to keep themselves safe from harm, to learn to take risks relatively safely. Thus, there is an inherent tension in responsibility, in risking, between the benefits and the harms. Much like Socrates and Protagoras, Smith (1990) suggests that efforts to "calculate away risk broach a technological mode of revealing the things of the world, thereby denying us the involvement and commitment that is the real measure of risk-taking" (Smith 1990, p. 69). The risk that we must take as public health providers is then allowing people to take risks, but also to be there for them, to expose danger, to care for them such that people have an underlying sense of security. Perhaps, this is the role of public health and health advisories?

We can understand our "chemical contamination dilemma" by considering Welch's (1990) ethic of risk, a study of nuclear arms risk. Welch suggests the threats from the nuclear arms industry are as much a consequence of responsibility as irresponsibility. It began through good intentions, a quest for safety, protecting our boundaries. But that quest has led us to the capability of destroying ourselves.

Likewise, the U.S. Centres for Disease Control, the preeminent research facility for public health in the U.S., was created during World War II as a component of the U.S. Public Health Service for the spraying of DDT to control malaria among U.S. troops (Hrudey S., personal communication, 1997). The "chemical treadmill" in food production began as a quest for stable food production, to remove the risk. It began through good intentions. However, our search for security has brought us to seriously contaminate the environment. What is the "chemical treadmill"? Are we going along as spectators and not actors? Consider again the replacement of DDT with toxaphene (see section 1.2 and section 3.8.1). How was the decision made to switch to toxaphene when DDT was banned? Through considering safety, after consciously reflecting on the risks of DDT and toxaphene? Is this the treadmill? And did we learn? Are the chemicals we are now using since the 1982 banning of toxaphene, safer? Has the decision been made through consciously reflecting? Will the issue of health advisories to the public help? Likewise, consider the "green house" effect, "acid rain" and the "hole in the ozone layer"; how are we "going along"?

Kalter (1993) points out that we have become aware that we live "within a sea of chemicals".[12] How do we face the risks associated with the "sea of chemicals"? Kalter offers the two foolish counselors to deal with the multitude of risks, and says "All in all we are a resilient species, as would be expected of evolutionary sifting and genetic multiformity. Two opposites, though - complaisance and panic - must be guarded against" (Kalter 1993, p. iv). But where is the golden mean between these two foolish oppositions? How do you calculate this mean? Is the mean any less foolish?

Our problem is like Wilde's "race car driver", learning how to pull back the boundary. What is *sophrosyne* for environmental health?[5] The affective attitude of Socrates provides a solution. Socrates, the activist, examining the reasons for actions, inhibits "going along". Socrates increases the tension between responsibility and irresponsibility. In public health, public health providers "first perceive" and seek the public in the cave. Indeed, when should we begin seeking the public? How should we help the public come to see? How can the public help us to see?

4.8 Conclusion

The concept of fostering autonomy through mutually respectful relationships has been developed by considering the historical Socrates. With the rich background of Socrates' affective ethical attitude, the concept of fostering autonomy can serve as a meaningful principle to help guide public health risk communication in an ethical manner. By considering the *Charmides* and *Protagoras* dialogues, a new model for the relationship between public health providers and the public has been developed based in fostering autonomy. The relational ethics conception of risk provides public health with a perspective of their role in the development of people's lives, toward creating healthy communities, and perhaps a healthy relationship with the environment. This can serve to guide health risk communication.

The next chapter will focus specifically on the development of health advisories that consider the concepts developed above. Health advisories must "match the psyche of the people" who will use the advisory and also serve to lead people to a better understanding of health risks. How can this practically be achieved? At a minimum, this necessitates a genuine dialogue between public health providers and the public.

Notes

4.1 (section 4.1) In the *Protagoras* dialogue, Socrates takes a boy named Hippocrates to meet Protagoras the famous Sophist (see section 4.4.6). Hippocrates the boy is named after Hippocrates of Cos, the medicine man from whom we have inherited the practice of public health (see note 3.1). Why does Plato introduce Hippocrates the boy in the *Protagaras*? Is this the first critique of paternalism in health care? This will be taken up briefly in sections 4.5 and 4.6, and the discussion extended in note 4.7.

4.2 (section 4.3) Socrates' suggestion that the "brain that supplies our senses of hearing and sight and smell, and from these memory and opinion arise" is a paradigmatic change from previous thought. The paradigmatic change may have been in the air in Greek times and is discussed in the Hippocratic essay, the *Sacred Disease*. The essay is claimed by Erotian as a genuine work of Hippocrates but Ermerins regards it as a patchwork piece much later than Hippocrates (Jones vol. 2, 1923). The ideas of the brain are interesting, but still the anatomy is confused:

> The eyes, the ears, tongue, hands and feet perform actions which are planned by the brain, for there is a measure of consciousness throughout the body proportionate to the amount of air which it receives. The brain is also the organ of comprehension, for when a man draws a breath it reaches the brain first, and thence is dispersed into the rest of the body having left behind in the brain its vigour and whatever pertains to consciousness and intelligence. If the air went first to the body and subsequently to the brain, the power of understanding would be left to the flesh and blood-vessels... (The Sacred Disease, Chadwick and Mann 1950, p. 192)

The Egyptian medical theory (1900 to 1250 BC.), described in *Human Anatomy and Physiology of the Ancient Egyptians,* gives an account of the "thought" emanating from the "heart":

> It is so that heart and tongue have power over all organs, according to the theory that the heart in every body and the tongue in every mouth, of all gods, men, and animals. The heart thinks everything it wants, and the tongue orders everything it wants. The seeing of the eyes, the listening of the ears, the inspiration of the nose, they all give information to the heart.

> It is the tongue that repeats what the heart has thought. Thus every function is performed and every work; the creation of the hands, the going of the feet, the motion of all limbs, according to the order of this heart. (Junker H. translation of Papyrus Ebers, 3, p. 67. In: Bodenheimer FS. The History of Biology. Dawson and Sons Ltd. p. 149).

Similarly, the Hindu medical tradition sees the heart as the abode of consciousness (cetana, the thinking substance and function). Heinrich Zimmer interprets this reference to the heart's being a centre of thought put in contrast to the brain as an instance of controlled impartial reasoning:

> The thinking of the primitive man - and this respect the Hindu is near the archaic, the primitive type - has not yet become abstracted from the center of feeling to the extent that is reached later with intellectual type through critical self-control. He is more inclined to feel his thoughts and decisions rise from the emotional sphere in his organism, that is from his trunk....
>
> In the same way, a Pueblo Chief, discussing psychology with my eminant friend Dr. Jung of Zurich, explained to him, "I know you white man think with the brain. We red men think with the heart". (Zimmer H. Hindu Medicine p. 162)

What is interesting is that, metaphorically, we have come to emphasize the "brain" over the "heart" as the centre; we are modern in contrast to the primitive. The Pueblo Chief raises a point which we should consider seriously in the search for new ethical and decision-making models. How do we come to terms with "gut reactions" in decision-making - the existential and deliberative aspects of decisions? Relational ethics develops a new deeper centre, one that holds the primitive and the modern conceptions, the brain and the heart, in tension as concrete oppositions or abstractions (see section 2.4). Does the thought of 'risk' provide us with insight to this centre? (see section 4.7.1 then note 4.8)

4.3 (section 4.4) Science enters the picture for healthcare providers by supplying the impetus for deliberation, to define what is or is not 'risky'. This is a technical concept of risk often defined as some combination of the probability and magnitude of predicted harm with time. Risk numbers provide the impetus for healthcare providers' reversal from the nondeliberative to the deliberative realm (and vice versa).

Consider daily alcohol drinking - where does one draw the line between risky and nonrisky? The general rule of thumb is that the risk increases with dose. With respect to fetal alcohol syndrome, the risk numbers vary. Some claim that only heavy maternal consumption results in fetal alcohol syndrome whereas others suggest that there is no ability to estimate a safe dose at this time (see section 3.7.2). When should a pregnant women deliberate the risk to the fetus: after a small glass of beer, 2 beers a day, or 5 beers a day? And when is it safe with wine?

The 'risk number' is used as a point of reflection, movement from the nondeliberative to the deliberative realm, but also a point of discussion of the experience of risk and its cultural construction. It is important to understand the context in which risk communication must operate. The following anecdote will demonstrate the risk number with the development of autonomy, and the agency-environment dynamic.

During one episode of the popular cartoon series "The Simpsons", Homer Simpson, the overweight working class father, is laughed at for being overweight. Homer runs to the washroom and steps on the scale. He glances down nervously as the numbers oscillate around until settling on his weight of 280 pounds. Homer cries, "Oh my GOD, I'm a big fat pig!" Homer's wife Marge tries to comfort him, "You have big bones, Homer." But Homer quickly hollers, "You don't gain 60 pounds in bones! That's it ... I'm going on a diet ....I'm going to reach my scientifically determined optimum weight! From now on, NO pork chop will be irresistible no matter how large and juicy!"

In this short scene, Homer has realized a problem, his obesity, which he feels is a significant risk. The risk number provided the impetus for reflection, to the movement from nondeliberative to the deliberative realm. The risk is multidimensional and ranges from social acceptance to health concerns. Homer decides to deal with the risk in a rational manner; he will diet until he reaches his scientifically determined weight. He envisions himself at the scientifically determined weight - accepted, not fat, and healthier. It represents the possible future, the "projected Homer".

As Homer goes through his life, trying to diet, to resist the delicious pork chops he loves so much, he reflects on the "projected Homer". He measures the "change in himself" by weighing periodically. The number on the scale becomes the yardstick which measures the progress towards realizing the "projected Homer". The external standard is related to an internal change in the body and mind.

However, Homer still lives in the same house in Springfield, has the same job, and sees the same world. People interact with Homer in much the same manner. They have not changed their attitude to Homer because he has expressed a desire to lose weight. His friends will still desire his company at the Moe's, the neighborhood tavern. The city has not changed either. Homer's favorite pizza place still has the enticing flashy neon sign. Homer must experience life in pretty much the same environment. The environment in which Homer lives and works, the way he does things, the way things are done in Springfield, represents the "structure" of the environment. Homer's ability to change within this environment, to further realize his "projected self", is called “agency”.

What should be the role of risk communication in Homer's life? Should risk communication tell Homer his scientifically rational weight, help him define the “projected Homer”? Should risk communication function in getting people to see themselves, as Homer came to, as fat pigs, to initiate their self-reflection? Should risk communication focus on enhancing Homer's agency or alter the structure, the environment of Homer's experience?

It is clear that factors other than science play a role in communication of risks and the decision to have the public deliberate. Cultural and economic factors play a large role in deciding what is risky and what risks should be treated aggressively. Consider the latest research on the risks associated with cellular telephones and driving; cellular telephones cause a 4 fold increase in the risk of driving accidents (New England Journal of Medicine, Feb 97). Should we adopt the same slogan as that for drinking alcohol and driving: "If you talk on the cell phone and drive, you are a bloody idiot!".

What motivates the alcohol message? Clearly, if we aggressively communicated all risks, the words would lose their power and would not serve to invoke deliberation. If we called people "idiots" for every behaviour that did not conform to some "rational risk calculus", we would foster hostility and perhaps even idiocy itself. Therefore, we need to be careful about what we say about risks. Should alcohol and tobacco constitute the extreme?

Risk is about gambling (Bauman 1993). We risk the good as well as the bad. Risk is generally used only for negative outcomes in science culture, it means explicitly negative outcomes, hence the popular dichotomy of "risk/benefit". A word for the probability of positive outcomes has not been put forward. Without reference to a particular disease, positive outcomes have no name. However, there are "positive risks" and we use risk numbers to express predicted benefit within western culture, for example, "An apple a day keeps the doctor away."

Diet is made up of thousands of essential and nonessential chemicals for sustaining life. This represents a case where chemicals are beneficial. Fruits and vegetables are a positive risk. Indeed, healthcare providers have been trying to have people deliberate the benefit of a good diet for most of this century (see section 3.6.2). For example, McHenry in 1949, argues that: "the principal reason for poor choice of food is that a considerable section of the population either does not know which foods should be used or doesn't care, ... and the $64 question in nutrition, is what can be done to make people care" (McHenry 1949, p. 271). We would like the public to develop the habit of a good diet. When a good diet becomes a daily practice then the public would not need to deliberate any longer, they would have reversed to the nondeliberative realm.

The public, and healthcare providers (as they are not acultural beings), do not necessarily use risk numbers to decide to reverse from the deliberative to nondeliberative realms. Risk is a cultural construct and cultural norms may function more predominantly in deciding what is risky (Slovic 1992). For example, tobacco smoking was not considered a risk until the 1950s, so we did not question smoking because it was part of our culture, much like driving our cars and drinking alcohol. We sat in smoke filled rooms without questioning the stench on our clothes or the effects on our health. Some risks become such a part of the structure of our lives that we are not in general able to see them, deliberate clearly upon them; we are culturally blindfolded and the blindfold allows us to sleep. In the late twentieth century we are questioning smoking, and chemical contamination of the environment more generally. We are taking off the cultural blindfolds, not to become acultural, but to see our culture; we are waking up to our undreamt pollution.

4.4 (section 4.5) The concepts surrounding *sophrosyne* can be discussed with respect to the concept of measure. Recall, (see section 4.3), the concept of measure means proper ratio or balance between things, and expressed the limit or boundary of things. Each thing, including humans, could be said to have its appropriate measure, so that when human behaviour went beyond its limits, proper measure, this would result in tragedy. Interestingly, the word medicine comes from the word cure, which comes from the concept of measure. To be healthy thus means to have everything in a right measure, in body and mind. *Sophrosyne* or temperence has been discussed as moderation, which also comes from the concept of right measure. Nietzsche (1870) points to a relation between Apollian and Dionysian elements, the two creative forces each enhancing the other. Perhaps the meaning of *sophrosyne* is in their mysterious marriage - Apollo as a measure of Dionysus' raw force of life.

This concept of *sophrosyne* will be developed further with respect to risking in the final section 4.7.2. Is *sophrosyne* missing in the twentieth century, perhaps the underlying problem with respect to chemical contamination of the environment and our quest for unending growth? (see note 3.7)

4.5 (section 4.5) The point of this note is to understand the problematic statement in the *Charmides* that "the soul is the source of all good and evil and overflows into the body". The passage could be considered consistent with the reasoning in the *Phaedo*; what must be present in a body to make it alive is the soul (see note 3.3). Is this a causal relation? The problem can be approached by consideration of Socrates in relation to the pre-Socratics, or in context of the ancient Greek problem of the "one and the many" (see Copleston 1962). This discussion was begun in developing the metaphor of the plant (see section 3.3.2 and note 3.9). From this discussion the relation between soul and body in the *Charmides* can be approached. I am trying to show that for Socrates, the soul and the body are "essential oppositions".

The relation of Socrates to Heraclitus and Anaximander is difficult to determine as there remain few of Heraclitus' writings, small fragments of Anaximander's, and Socrates did not write. In the *Cratylus* dialogue, Heraclitus is discussed, but Socrates' relation is not clearly articulated. Like the other dialogues, we never obtain a clear sense of Socrates' position. It is of interest that both Socrates and Heraclitus were in the Delphic order.

I consider Socrates to be in keeping with the line of thinking running through Anaximander and Heraclitus, rather than through Thales and Democritus. I'm not saying that Socrates agrees fully with anything they have to say. Indeed, Socrates claims there is no method to distinguish theories of the one and the many (see note 3.2). However, my intuition for this stems from thinking about Socrates' "inward eye" (see note 3.5), the *process of becoming*, and that he tries to describe virtue as one (see *Protagoras* dialogue, section 4.6.2). If Socrates is in keeping with the line through Anaximander and Heraclitus then perhaps he views the soul and the body as abstractions.

Heraclitus held that the conflict of opposites is essential to the being of one, that the one and only one exists in the tension of opposites. Copleston (1962) suggests that this is different from Anixamander, in that Anixamander regards the war of opposites as disorderly, something that ought not to be. However, they both identify with something primary, the *urstoff,* from which the opposites emerge.

We can approach the problem by considering how Socrates discusses the ideas of change and the opposites in the *Phaedo* dialogue. Socrates distinguishes between concrete and essential oppositions. He describes concrete opposites, like pain and pleasure, saying: "They are two and yet they grow out of one head or stem" (see section 4.7.1). Socrates asks: "Let us consider this question, not in relation to man only, but in relation to animals generally, and to plants, and to everything of which there is generation. Are not all things which have opposites generated out of their opposites?" This is what Socrates says of pleasure, that pleasure comes following after pain. Socrates says there must be two intermediate processes or processes of generation for this to occur: from pain to pleasure and pleasure to pain. This is the case of concrete opposites, where opposites are generated from opposites.

In the case of essential opposites Socrates says: "They will never admit of generation into or out of one another". Essential opposites exclude one another. An example of the essential opposites is life and death and odd and even numbers (see note 3.3). In the *Charmides*, a person is composed of "mind and matter" or "body and soul". Body and soul do not flow into one another like the concrete opposites of pain and pleasure. We can think of the person composed of essential opposites, body and soul.

Should we think of the body and soul in terms of Socrates' metaphor of the plant, the organism and environment as abstract oppositions? We can treat the body and soul as abstractions, the oppositions in tension of the one being. We can develop Socrates idea of the concrete opposites as being "two heads from one stem". Is there "one stem" for the essential opposites body and soul? For this we can turn to an idea introduced through Orphicism.

Copleston says Orphicism was connected to the worship of Dionysus, a worship that came to Greece from Thrace or Scythia and "it is a fact that Orphic initiates, who, be it noted, were organised in communities, were taught the doctrine of the transmigration of the souls, so that for them it is the soul, and not the imprisoning body, which is the important part of man; in fact, the soul is the real man, and is not the mere shadow image of the body as it appears in Homer" (Copleston 1962, p. 48). The reference to Thrace here and to Socrates' medical lessons in the *Charmides,* may be coincidental. What does soul mean here? It seems different than psyche or mind (see note 4.2). Plato in describing the human body distinguishes the body and soul from a "soul of another nature" (see section 4.7.1). Perhaps this "soul of another nature" is what the Orphic initiates were taught and is the ground of the body and soul in the *Charmides*.

This idea can be taken one step further by considering Socrates' theory of causation in the *Phaedo*. Socrates provides his tentative theory of causation; he assumes absolutes, like beauty, and when things have this quality, like beauty, they partake in the absolute of the quality. Socrates says: "Nothing makes a thing beautiful but the presence and participation in beauty."

The problematic statement in the *Charmides* is that the soul is the source of all good and evil and overflows into the body. Perhaps then it is the "soul of another nature" which is the source of all good and evil. What is present and partakes is the stem, the soul of another nature. The stem is a relatively autonomous being. It is the presence and participation of the stem in the *urstoff* which allows for existence. At this point I must reiterate my closing in the introduction to the thesis: pull me from the muddy waters and lay your hand on the gong.

4.6 (section 4.6.2) Socrates and Protagoras argue that the virtues are related to each other like parts of a face. This conception of the face as made of parts is focused on the explicate order, or extended space as primary. The parts are seen to exist separately like the stars. Socrates and Protagoras have difficulty in relating the parts of virtue as the eye does not resemble the nose, and so on. The question of virtue is a "one and many" problem. How are the parts of virtue, the many, related as a unity, the one?

Recall that Socrates is said to have had a "turning of the eye" where the eye now focuses on an inner order (see note 3.5). The inner order is analogous to the way the parts of the body are related; each part grows in the context of the whole, so that the part does not exist independently. However, the conception of the face is presented as an explicate order. This can be explained analogously to Socrates' conception of the size of men with an inward eye (see note 3.5)? However, does Socrates want for a model to express this "inner order" that he sees and the explication of virtue?

The relation of an implicate order and an explicate order can be understood by thinking of television. In a television broadcast, the visual image is translated into a time order to the television as a radio wave. The radio wave carries the implicate order and the function of the receiver of the wave, the television, is to explicate this order. Notice that in the radio signal, the proximity within the radiowave, the implicate order, does not necessarily correspond with proximity in the explicate order, the picture on the screen.

Now, imagine if we gave Socrates and Protagoras a hologram (like a three dimensional camera) as a model to develop a "new eye" and a copy of Bohm's *Wholeness and the Implicate Order* (Bohm 1983); would they be able to describe virtue as a unity? The hologram contains an enfolded or implicate structure, all the information to reproduce the whole, the explicate three dimensional image when light is shone upon it (see Bohm 1983, p. 145-146). The important key feature is that there is no "point to point correspondence" of the object and the recorded image, like a normal camera.

Protagoras and Socrates notice that the explicate parts of the face are separate and unrelated, but they are searching for an argument to bring the diverse parts together as a whole. The hologram would thus provide Socrates and Protagoras with a new physical model for their views of the unity of virtue in the implicate order expressed explicitly as parts of the face.

Socrates is concerned with human conduct as much as with definitions. Socrates sought to fix the virtues in universal definitions so they could be taken as a guide and norm in human conduct (Copleston 1962). We can approach the problem of the manifestation and teaching of virtue in a particular situation with Socrates' "plant metaphor" (see section 3.3.2). If virtue is a part of human nature, as Socrates and Protagoras believe, then each person would be endowed with virtue as a whole, and this needs to be cultivated. Socrates' *process of becoming* is thus providing an environment that promotes the explication of the unity of virtue within each individual. Socrates' creating people is helping people unfold, explicating what is implicate, teaching virtue through providing the environment for the explicate expression of virtue in a variety of environments. With each new action, a person can be thought of as unfolding or explicating what has been learned through previous experiences in a complex relationship with the unique momentary environmental condition. Perhaps this approaches understanding the education method of Socrates (see section 4.7.2).

4.7 (section 4.6.3) The purpose of this footnote is to discuss the role of Hippias in the *Protagoras* dialogue and clear up the purpose for Plato's reference to Hippocrates of Cos with Hippocrates the boy. Has Hippocrates been wrongly identified as the root of paternalism? Note that Jones suggests that the *Art of Medicine* in the Hippocratic corpus was written by Sophists, possibly Hippias or Protagoras. Socrates and Protagoras are friends, meeting people in the open, face to face. What about the theory of Hippocrates the boy in the *Protagoras*, the key to our present ethical dilemma?

The relationship between Socrates and Hippocrates of Cos is difficult to examine because Hippocrates did not write about Socrates, and Socrates did not really write at all. The two men could have met at the battle of Delium (424 B.C.). Plato places Socrates at Delium in the *Apology* and *Laches* dialogues (see Introduction). Laches says: "Socrates was my companion in the retreat from Delium, and I can tell you that if others had only been like him, the honour of the country would have been upheld" (Laches 181b). Xenophon also places Socrates and Hippocrates together at Delium. Pericles says: "All this is true Socrates. But you can see that ever since the disasters suffered by Tolmides and the thousands at Lebadia, and by Hippocrates at Delium, the prestige of Athens has been low" (Xenophon 1990, Memoirs of Socrates 5, p. 146). If this is the case, then Hippocrates of Cos must have been born in ~460 B.C. rather than ~430 B.C.. These are the two birth dates in the literature. Thus, Hippocrates would have been 10 years younger than Socrates (born in 470 B.C.) and about 30 years older than Plato (428-327 B.C.).

As I have claimed, Heidel (1941) argues that Socrates and Hippocrates share many common doctrines with respect to health (see section 3.1 and note 3.2), and they both share the ethical principles of beneficence and non-maleficence. There are also some important similarities to the *Hippocratic Oath* in Socrates' passage about teaching. Socrates says he is not a teacher but he will discuss any problem with anybody (see section 4.2).

Socrates also says he never charges a fee but never speaks without one. Xenophon says Socrates was protecting his own independence, that those who charge a fee are "self-enslavers" because they were obliged to converse with those who paid the fee. In comparison, the *Hippocratic Oath* says: "I will teach them (the master's sons) the science, if they desire to learn it without a fee". There is a similarity in not charging a fee. Socrates even says: "I won't talk without one"? However, what does the oath mean by teach? Is this where the ethical problems we have been searching for in our healthcare relationship originate?

Jones suggests there are five essays that deal with medical etiquette: *Oath*, *Law*, *Physician*, *Decorum* and *Precepts*. Jones discusses the evidence to suggest that medical etiquette refers to a medical secret society. In the *Precepts*, a genuine physician is "one made a brother". Jones suggests the last sentence of the *Law* is perhaps the darkest spot in Greek literature: "Holy things are shown to holy men; to the profane it is not lawful to show them until these have been initiated into the rites of knowledge" (Jones 1923, II p. 275). Note that even *the Oath* suggests, "I will teach the masters sons". However, Jones suggests there was no medical guild at the time of Hippocrates.

The very problematic essays dealing specifically with health in the Hippocratic corpus are the *Art of Medicine*, written at the time of Socrates and Hippocrates, and the *Decorum* (see section 2.3), which is consistent with the perspective of the *Art of Medicine* but it is believed to be written after Hippocrates (Jones 1923). The *Art of Medicine* is arguing against critics of medicine. To prove the worth of medicine, a dichotomy between healthcare providers and patients, the rational and irrational, is set up very much like some "risk expert - public" distinctions drawn now. The text argues that patient noncompliance is the cause for medicine's failings (The Art, section 7). Patients are depicted as incompetent and unable to carry out the instructions of the physician:

> It is much more likely the sick cannot follow out the orders than the physicians give wrong instructions. The patient knows neither what he is suffering from, nor the cause thereof; neither what will be the outcome of his present state, nor the usual results of like conditions. In this state he receives orders, suffering in the present and fearful of the future. (Jones 1923, p. 201)

The author then asks: "What is more likely, the patient obeys or the physician gives proper orders?" Jones' translation reads: "The patient not unnaturally is unable to follow; and not following them he meets death, the cause which illogical reasoners attribute to the innocent and let the guilty go free." Chadwick and Mann (1950) translate the answer:

"There can be no doubt that the patients are likely to be unable to obey and by their disobedience, bring about their own deaths" (Chadwick and Mann, 1950, Art VII). The passage introduces contempt for patients and the public. Jones (1923) presents the arguments that the author is a sophist and in particular the case is strong for Protagoras and Hippias.

Interestingly, Hippias is also present in the *Protagoras* dialogue. Hippias is introduced when Socrates and Hippocrates the boy enter the house to see Protagoras. Plato writes, there is Hippias of Elias:

> Sitting on a seat of honor in the opposite portico, and around him were seated on benches Eryximachus, Phaedrus, Andron, and some other citizens. They appeared to be asking him questions of natural science, particularly astronomy, while he gave each his explanation ex cathedra and held forth on their problems. (Protagoras line 315c)

Jones (1923) also points out that in the *Protagoras*, Plato puts in the mouth of Hippias a remark that is reminiscent of the *Art of Medicine*:

> After this wise Hippias spoke up: Gentleman I count you all kinsmen and family and fellow citizens - by nature, not convention. By nature like is a kin to like, but custom, the tyrant of mankind, does much violence to nature. For us then who understand the nature of things, who are the intellectual leaders of Greece, and in virtue of that very fact, we are now assembled in Athens, the center and shrine of Greek wisdom, and in this the finest house of that city, it would be a disgrace if we produced nothing worthy of our fame, but fell to bickering like the lowest of mankind. (Protagoras line 337d)

In both of these speeches, Hippias "professes a knowledge of nature", and this is particularly where both Socrates and Hippocrates have great difficulty, especially in applying theories of nature to health (see note 3.2).

Hippias continues the last fragment, proposing that someone mediate the argument between Socrates and Protagoras: "Allow us to act as mediators and bring you together in a compromise" (Protagoras line 338). However Socrates replies:

> It would be unfitting to choose an arbitrator over our words. If he were a man of lesser attainments, it would be wrong to set him over his betters,

> and if he were someone like ourselves it would still not be proper, for in resembling us he would act like us, and his appointment would be superfluous. Well then, you will say, we will choose someone superior. But the fact is, in my opinion,that it would be impossible for you to choose anyone wiser than Protagoras, and if you choose some lesser man and pretend he is better, this again would be to insult him, appointing someone over him as if he were nobody. For myself I am indifferent. (Protagoras line 338c)

Socrates provides a solution, which does not require anyone to think that they are better, to profess to know more than other people, or assume that they can simply resolve ethical problems through compromise. Socrates says: "We do not need a single arbitrator, you will all keep watch on us together, and all encourage each other to answer questions, so as not to spoil the discussion" (Protagoras line 338d). Socrates will not allow the means of enquiry to be subordinated through compromise. This requires that the discussion is public, or open, much like Socrates' position in the *Apology*: "If anyone asserts that he has ever learned or heard from me privately anything which was not open to everyone else, you may be quite sure he is not telling the truth" (Apology line 33b).

Further, when Protagoras defends his teaching to Socrates and Hippocrates the boy, he says:

> Hippocrates will not be put through the same things that another Sophist would inflict on him. The others treat their pupils badly. These young men, who have deliberately turned their backs on specialization, they take the plunge into special studies again, teaching them arithmetic and astronomy, and geometry, and music - **here he glanced at Hippias.** (Protagoras 318e)

If we follow Protagoras' eye and look to Plato's *Lesser Hippias* dialogue, the opening between Socrates and Hippias points out the character trait that concerns Socrates, the "profession of knowledge":

> Socrates: Truly Hippias, you are to be congratulated, if at every Olympic festival you have such encouraging opinion of your own wisdom when you go up to the temple. I doubt whether any muscular hero would be so fearless and confident in offering his body to the combat at Olympia, as you are in offering your mind.

> Hippias: And with good reason Socrates, for since the day when I first entered the lists at Olympia I have never found any man who was my superior in anything.
>
> Socrates: What an ornament, Hippias, will the reputation of your wisdom be to the city of Elis and to your parents! (Lesser Hippias line 364)

Is Hippias' attitude, the 'ornament' that has survived to our times, the profession of knowledge from behind the mask? Plato portrays Hippias as having the typical sophistic traits which concern Socrates. In light of this, we should reflect again on the introduction of the *Protagoras* dialogue; why did Plato introduce Hippocrates the boy, what is Plato's aim?

Benitez (1992) points out that at the beginning of the *Protagoras* dialogue, Socrates is asked by a friend about his discussion with Protagoras, and that the introduction of Hippocrates the boy is a digression. Benitez suggests that Hippocrates' importance is illustrating the character of the sophists in the dialogue. Through Socrates' relationship with Hippocrates the boy we can see the ethical attributes of Socrates, promoting the good and preventing the harm that may come to Hippocrates the boy from some Sophists. Further, Protagoras, a sophist, distinguishes himself from traditional Sophists through showing his face; he does not hide behind a mask. However, Benitez is not interested in our question and does not discuss the explicit reference to Hippocrates of Cos.

Was Hippocrates of Cos the founder of the cult of profession, the secret society? Or did he follow Socrates? If we remove the *Art of Medicine,* argued to be the work of Sophists, possibly Hippias or Protagoras, and the *Decorum* and the *Laws,* which come after Hippocrates of Cos, then we should ask: Is the Hippocratic tradition still a serious problem? Is Hippocrates of Cos a paternal healthcare provider?

There remains one key question about Hippocrates of Cos. The *Oath* does not contain an explicit mention of 'fostering autonomy' or the 'double process'. Thus, what does Hippocrates mean in the *Epidemics* essay (attributed to Hippocrates) that the physician "serves the science" (Epidemics Essay, Book I, ii-11) (see section 2.3)? Perhaps it means, as Heidel (1941) claims, that Hippocrates is following Socrates, and the scientific method must be used; we don't want any quacks around here. This requires being open to question "face to face" which is necessary to follow Socrates' lead. This is much like Protagoras who distinguishes himself from the traditional sophists. Perhaps "serving the science" can be taken as following the method of Socrates as in the *Charmides*. Perhaps then, Hippocrates has been misunderstood. He does he belong in the "paternal Hippocratic tradition", as I claimed in sections 2.2 and 2.6. Perhaps we should follow Socrates' advice in our treatment of Hippocrates of Cos. When Hippias claims that he and Homer are of the same opinion, Socrates says: "Well then, as there is no possibility of asking Homer what he meant in these verses of his, let us leave him." (Lesser Hippias line 365d)

As Bauman (1993) suggests, the postmodern ethical perspective "means above all tearing off the mask of illusions" (Bauman 1993, p. 3). The illusions boil down to a belief that the messiness of the world will eventually be replaced by a nice set of rules that we can "profess to know". For us, then, the question that public health providers must ask themselves, when they go *to knock on the door of the public*, is: Should we take the course of Socrates, recognizing our ignorance, the ambivalence in the ethical, the capacity for reflection in the other, by meeting people face to face? Or alternatively, should we take the course of the sophists, with the 'ornament' of Hippias, behind the mask, thwarting self-examination through the profession of knowing? Let's steal this 'face' right off our heads.

4.8 (section 4.7.1) In keeping with footnote 4.5, "pain and pleasure" can be understood as the basic abstract concrete oppositions of his experience. Similarly, in the beginning of the *Phaedo*, Phaedo says of his experience of Socrates' last day: "I remember the strange feeling that came over me at being with him... I was pleased and I was pained because I knew that he was soon to die, and this strange mixture of feeling was shared by us all; we were laughing and weeping." With this notion of concrete oppositions in mind we can continue the discussion of note 4.2 with respect to the metaphorical centers of "heart and brain".

Bohm (1983) suggests that "pain and pleasure" is one of the most primitive forms of thought. The thought of "pain and pleasure" holds in conjunction an abstract image in the mind with an abstract feeling. This is perhaps the take off point to approach a deeper center than those of the "heart and brain". Along these lines, the perception of risk can be discussed as one of the primary thoughts in human development emerging from this deeper center and thus not associated explicitly with either knowledge or emotion, heart or brain. Indeed, perception of risk has been proposed as a primary impetus in the development of human sciences and ethics in Greek times, in the Hippocratic corpus, by Plato, by Dewey (1929), and by many in the current rise of risk studies.

4.9 (section 4.7.1) Plato distinguishes fear into two kinds: evil and shame. Evil is associated with disease, injury and poverty which causes pain, and thus is very close to health risk in a modern conception. Shame is associated with reputation, and in Greek culture, public image was of paramount importance. Notice that Plato has both Hippocrates the boy and Protagoras blush when they cannot anwer Socrates' questions (see Protagoras dialogue, section 4.6). Interestingly, the risk-taking theory of Wilde is based on an embodied mechanism for determining risk; risk homeostasis is maintained by an internal "risk thermostat" and Wilde says he was concerned "with making a fool" of himself in publishing his thoughts (Wilde 1994, p. 25). Wilde did anyway, perhaps showing courage - risking shame.

4.10 (section 4.7.2.1) The probabilistic conception of risk can be understood from early studies in risk perception that culminated in a paper by Slovic, Fischhoff, and Lichenstein (1982) entitled "Facts versus Fears: Understanding Percieved Risk". The first point is that risk means probability. They asked people to "rate the risk of death to an activity". Risk of death is the same as the probabilty of death; either word can be used in the sentence. Slovic et al. (1982) observed that perception deviated from what they expected. The authors comment on the judged number of deaths per year with the number reported in public health statistics: "If the frequency judgement were accurate, they would equal statistical rates, with all data points falling on the identity line. Although more likely hazards generally evoked higher estimates, the points seem scattered about a curved line that lies sometimes above and sometimes below the line of accurate judgement. In general, rare causes of death were overestimated and common causes of death were underestimated" (Slovic et al. 1982, p. 466). In the probabilistic conception, a person with a rational perception of the risk would have a one to one correspondence with the estimated number of deaths and actual number of deaths for a particular event. Probability means risk.

The second point was that risk was "objective"; in this case mortality data give the objective risk. Each death and activity can be isolated and removed from the context of its place in the world, and compared with other activities from different contexts. The risk, the actual number of deaths from a variety of activities, ranging from car accidents to nuclear accidents, can be plotted on the same graph. All these deaths and activities are considered of equal value.

The view of risk in these studies is the universal - "the mind's eye" (see section 4.3). The researchers are removed from the world. They are spectators. They see all the risks without interfering with them. They see the relativity of all risk - all the activities in the world independently, all the risks at the same time. From their spectator's chair they determine what is risky; they observe how many deaths each activity causes and assume they can assign the relative riskiness of each activity. Their own position in the world in relation to the activities is not considered to affect what is deemed "risky"; they do not consider the risk of their position.

The ethical problem created by the psychometric studies for risk communication is that the risk is depicted as possessing some objective property, that there is a correct technical or scientific view which the public must be educated towards. For example, Morgan and Lave's (1990) ethical approach to risk communication centres around a probabilistic conception of risk. Their calculated magnitude of probability and harm provides the impetus for their asserted right to manipulate or coerce the public in cases where they calculate large risks. Beauchamp and Childress (1994) define risk as the probability of harm. This probabilistic conception has shaped to a large extent the informational requirements of informed consent doctrines. Neither contextual details, nor individuals' own meanings of risk, play a significant role. Thus, the meaning of risk is imposed on the individuals in the world by the authoritative risk experts.

To understand how people actually perceive risks associated with any of these activities, and how people actually make judgements, we need to experience the context with them (Resnik 1987). For example, consider driving in a car down (a) a quiet empty road, as compared to (b) a busy highway, with icy patches and blowing snow. What would be the perception of risk in these scenarios? Risk perception in these cases is not from "the mind's eye", but the "eye on the road". Contrast this with sitting in a quiet classroom, with fifty questions on a form having little blocks for checking various probabilities, and the question asks: What is the risk of dying in a car? What is the context in the person's mind? Is it consistent with the researchers', from person to person? What if a person has not been culturally embedded within the world of cars, or the experience of accidents?

Krimsky and Plough (1988) claim that psychometric studies isolate cultural factors and treat them as variables in the experiment rather than understanding the context, building a culture-based theory of risk perception. Rapport (1996) argues further that some components of risk lie beyond plausible numerical representation, and that attempts to reduce radically unmeasurable components of the world to common metrics are not justified because they do not provide clarity and certainty nor aids to clear thinking.

More recently, Slovic has developed his approach. Slovic says that one of the most important assumptions in the risk perception studies is that risk is inherently subjective, that risk does not exist "out there" independent of our minds and cultures. Slovic argues that "there is no such thing as real risk or objective risk. The toxicologist's quantitative estimate of a chemical's carcinogenic risk is based on a theoretical model, whose structure is subjective and assumption laden, and whose inputs are dependent upon judgement" (Slovic 1992, p 119). This has been discussed extensively in Chapter 3.

Kunreuther and Slovic (1996) promote a contextual conception of risk developed by Thompson and Dean (1996). A contextual concept of risk places attributes of probability and consequences along with other attributes such as voluntariness, equity, familiarity, and time, where "the contextualist believes that risk will always be characterized by some subset of the attributes on the list, but that no single attribute will be understood to characterize every instance of risk" (Thompson and Dean 1996, p 369). This conception follows from Wittengstein's question of "What is a game?" where no single attribute of any particular game is "essential" to define all games; similarly, none of the attributes of risk is "essential" to define risk (Thompson and Dean 1996). This idea was introduced earlier by Rayner (1987).

The cultural and educational backgrounds of individuals will shape their thoughts on risk, as they give individuals a different theoretical background. With respect to chemicals, for example, different educational backgrounds or cultures of science, such as a physicist, a chemist, a biochemist, a biologist, a physician, a nurse, a public health provider or an engineer, will influence the values held about particular types of scientific information, scientific experiments, the language used to express this information and the general ideas about the complexity of biological systems. What is being questioned is commensurability: the ability to describe strict probabilistic notions of risk, or even a complex of qualitative and quantitative aspects that has the same meaning to all these public and science cultures. As Nietzsche (1887) suggests: "There is only a perspective seeing, only a perspective knowing; and the more affects we allow to speak about one thing, the more eyes, different eyes, we can use to observe one thing, the more complete will our concept of this thing, our objectivity be" (Nietzsche 1887, p. 119).

4.11 (section 4.7.2.2) Bohm and Hiley (1993) provide an interesting discussion of the concept of 'paradigm' in physics with respect to the distinctions of the different camps mentioned in Chapter 3: Democritus' "atom" and Heraclitus' "flux". Apparently Bohm was influenced by Plato's "allegory of the cave". In modern science, Democritus' idea predominates as it was maintained through Descartes' assertion that the extended manifest world was primary. Bohm suggests that we need to guard against the framing of the "ideas that get in there first" such that these should not uncritically prevail. For example, Bohm and Heisenberg discuss the profound effect of Democratus and Descarte in Western science; our thinking is in their shadow. They want to change the root to Heraclitus and Anaximander. But how can we simply drop our old ways of thinking, ways of seeing, and develop new conceptions? Without acknowledging our perspectives, we run the risk of educating people to think that they are not within particular paradigms, or that they can stand outside of paradigms as ideal observers. This has great import to risk management and we should take Bohm's advice and learn to have a "kind of dialogue between different interpretations rather than a struggle to establish the primacy of any one of them". This is the problem for xenoestrogens and understanding the synergistic and additive relationships in different experiments (see section 3.8.2.3). This idea of "dialogue between different interpretations" will be the focus of Chapter 5.

4.12 (section 4.7.2.2) I take Kalter's comment that we live in a "sea of chemicals" to be a reference to "the cave" analogous to the conception of William James (1907), in the introduction to James' essay on *The One and the Many*. From this essay, the relation of pragmatism to Socrates is made quite clear. James introduces the essay saying that the pragmatic method, "instead of ending with admiring contemplation, plunges forward into the river of experience with them and prolongs perspective by their means." This is Socrates' perspective in the Phaedo, identifying with the runner not the universal spectator. Likewise, Socrates does not offer finished concepts for all of us to admire. James refers to both perspectives of Socrates, the universal eye and the runner, and says: "Both worlds are real of course and interact, we are like fish swimming in a sea of sense bounded above by the superior element, and every time we touch it, we turn back into the water [Socrates' aether] with our course re-determined and re-energized. The abstract ideas of which air consists are indispensible for life but irrespirable by themselves, and only active in their redirecting function." Like Socrates, James identifies with the cave, the sea of sense, Kalter's sea of chemicals.

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Chapter 5. Towards a Practical Ethical Approach to Health Advisories

5.1 Introduction

This final chapter offers an approach that responds to ethical concerns in public health risk communication practice (Bates 1994) and develops ideas towards a process of informed consent for the development of health advisories in public health practice (see sections 1.2 and 2.5). Bates argues that public health decision-making and communication requires an approach that: (1) is based in objective risk assessment prepared by individuals with no financial stake (although there are other stakes as important), (2) provides an assessment which should be critiqued in public by a second group, and (3) is a process which should be in the public domain, involving those members of the public who are likely to be impacted. This is very important because, as shown in chapter 3, the scientific "facts have not spoken" as Ashford had hoped (see section 3.4.2).

Individual decision theory has made no proposals for broader rational or ethical claims and has concentrated more strictly on how decision-makers can advance their own self-interest (Resnik 1987). In this chapter, I do not propose a rigorous decision theory for ethics and science, but consider it within the category of decision under ignorance. I propose a practical approach for public health to develop *health advisories*, public notification of benefits and harms, and *chess advisories,* notification of public health providers of the emerging evidence in science (see section 3.6.1, using the metaphor of a chess game after the use of Godden (1958) to describe the emergence of knowledge of tobacco health risks). Further, perhaps the approach may decrease the fragmentation inherent in the development and promulgation of health advisories caused by the many divergent perspectives of risk in developing health advisories.

At the present time, there is no general decision framework for local public health authorities to develop health advisories for the people in their communities. There is also no general framework to discuss evidence on chemical contaminants or communicate about chemical risks more generally with other agencies (see note 4.11). The approach here is to help public health providers have a dialogue on risks using the risk assessment framework developed in Chapter 3, towards the development of health advisories. Local health authorities must release health advisories as situations arise, as they see a need to inform the public and as the public requests information. This final chapter provides a simple scheme to facilitate this dialogue.

The general ethical problem for public health practice is that there is not a "one to one" relationship with the public, and perhaps there is not genuine dialogue. The ethical concepts I discuss in this thesis deal mainly with "one to one" human relationships. However, in Bauman's terms (1993), public health is beyond the "moral party of two" and therefore ethical concerns must begin to consider the "principle of justice" (if justice assumes more than two people). A consensus on the principle of justice is not well-defined, and this chapter does not develop a concept of justice. At a minimum, it may be reasonable to suppose, in keeping with Rawls, that justice means fairness. The decision process for health advisories outlined in this chapter allows for reflection on scientific evidence and ethical principles through an overt discussion of values. Perhaps justice as fairness in this context means an overt discussion of the risk managers' values that drive decisions by which they can then turn to the public. In the end, the legitimacy of public health actions is grounded in the relationship with the public, and the goal of risk communication is the flow of meaning between risk managers and the public. The use of the word "decision" in the context of this thesis relates to the decision to create a process to better ensure that health advisory decisions are made on a participatory basis.

5.2 Starting With Rawls' *Outline of a Decision Procedure for Ethics*

Rawls (1957) is concerned with developing a decision procedure for ethics, a method that approaches objectivity for ethical rules analogous to that of science; that is, scientific objectivity grounded in a reasonable and reliable method to test propositions.

While it is doubtful that public health providers can meet all of Rawls' stringent requirements for "moral judges", the approach nonetheless provides a useful starting point for decision-making under ignorance (see section 3.2). I have earlier critiqued Rawls' general approach in developing the concept of relational ethics (see section 2.4). In keeping with this, the procedure needs to be extended to include members of the public; in particular, the specific formulation, the actual wording of advisories, needs to take place within the community, as opposed to outside the community behind "the veil of ignorance".

Rawls' decision procedure requires two groups of risk managers (moral judges): group 1, "competent judges" who analyze the particulars of a series of cases and generate a set of principles that guide decisions and actions; and group 2, "explicators" who test the principles through a process of explication. Explication of the judgements is defined as the application of the set of principles such that if they were applied to the same set of cases, made systematically non-intuitive by the explicit and conscious use of the principles, the judgements of the explicators would be identical case by case with the judgements of the competent judges (Rawls 1957). Rawls states further that the principles must be given in plain language such that an average person can apply them (i.e., a requirement for simplicity). Indeed, if we are going to try to communicate with the public, the cases must be discussed in a language that the public can understand.

In keeping with the concept of relational ethics, the process of explication needs to be extended to include the public. Public health providers need to "turn from the table to the public" with their recommended course of action and the principles that were developed for the specific cases. The public would then have the opportunity to examine the evidence with the decision principles and determine if they would reach the same course of action. The public can be thought of as a second group of explicators.

The involvement of the community or public at large may serve to bridge the incommensurability between public health providers and those who face the risk decisions. Involving the community may generate genuine dialogue and serve to motivate the public to become involved in public health decisions, through a relationship with public health providers. The "official risk managers" are thus only surrogate risk decision-makers: people who actually face the risks (i.e., those who experience the contaminants in fish or smog) make the actual risk decisions that might mitigate or compound actual effects. Indeed, this is why Socrates' principle of "fostering autonomy" is so important, especially for the case of acute toxicants. Socrates' "process of becoming" helped people think for themselves about risk decisions. Consider the negative answer to the question "Do smog advisories work?" (see section 3.1) Perhaps their failure is a result of the distance between the community and risk managers; the fact, in other words, that risk managers typically exist outside of the communities where the actual needs of those interpreting advisories and making risk decisions are located. This incommensurability is reflected in the actual wording of the advisory, which did not address people's actual decision-making needs; people said the advisories did not help because there was nothing they could actually in fact do (i.e., the advisories were impractical).

Rawls' procedure requires that public health providers explicitly document their preferences for particular evidence in reaching their decisions for particular cases. Thus, a mechanism to document preferences is required. Following the risk assessment framework, preferences about the evidence of hazard identification and dose-response relationships need to be evaluated, framed in terms of the Hill Causal Criteria (Table 5.1) (Hill 1965), and used to reflect on the exposure assessment. The basic decision framework for chemicals in the environment follows that introduced in Chapter 3: "one to one" to "many to many" causal relationhips. A series of cases developed along these lines will serve to show the weight of the ethical principles in relation to the scientific knowledge.

To provide a context, consider the example of an acute toxicant, like saxitoxin or hemlock poison, which is involved in a "one to one" causal relationship. On analysis of an acute toxicant, "competent judges" may argue that the principles of beneficence and non-maleficence mean: (1) that the toxicants should be removed from the environment, or (2) that necessary precautions are taken to minimize the potential for human exposure, like a barricade. Further, they may argue the principle of fostering autonomy means that, in the case of a barricade, a health advisory needs to be clearly given to the public so that the public is aware of the risk and know how to avoid harm, or in other words, understand the barricade. The "explicators" would then analyze an acute toxicant, non-intuitively following the principles specified for an acute toxicant by "competent judges", and should suggest: (1) that a barricade is necessary, or (2) that the toxicants are removed from the environment, on a case by case basis. If the "explicators" recommend a different action, this indicates that the principles are not worded clearly or simply, or perhaps are not specific enough to guide the risk managers' actions. In this case, the "competent judges" would need to reevaluate their principles.

The Public as Explicators

The most difficult aspect may very well be the inclusion of the public in the process as a second group of explicators. The main problem may be the lack of resources required to inform the public and the challenge associated with meeting the potential large demand for public health services in explicating decisions. Further, even with generous finances, a problem for public health is securing the public involvement and motivating their participation, and second, having the public become reasonably informed such that they can actually participate. These problems reflect the basic problems of democracy.

Public health practitioners should approach the public with historical cases, like tobacco, to provide a context for the public to assess the treatment of new cases, much like an anchoring heuristic. In the development of health advisories, the process of explication should include the wording of health advisories. The public then could determine whether an advisory is warranted and, as part of the process of explication, play a role in the actual wording of the health advisory such that it meets their needs.

5.3 Basic Scientific Start Position: Decision under Ignorance

In Chapter 3, the scope of the problem was presented: namely, that we face an enormous task in helping people (from scientists and public health providers to the lay public) to become aware of the multitude of industrial/man-made chemicals in the environment (approximately 70,000 chemicals). As presented in Chapter 3, health risk decision-making takes place under ignorance as a result of the progression of scientific knowledge and the lack of information with respect to the theoretical underpinnings of many risks (see section 3.2). The basic framework is the classification of cases or toxic substances with respect to causal relationships: "one to one" to "many to many". Within each of these relationships, preferences in the risk assessment, preferences of evidence to support the "Hill Causal Criteria" (Table 5.1), can be mapped for particular cases under the hazard identification and the dose-response assessment. This classification provides the basic framework to map the scientific cases with ethical principles.

In Chapter 3, I presented several examples along these lines: a) nutrition and the prevention of cancer (see section 3.6.2); b) the uncertainty in the case of the xenoestrogen chemical contaminants compared with the 56 identified carcinogens (Ashby et al. 1997) (see section 3.8); c) the role of incommensurability in the case of alcohol and breast cancer that resulted in divergent perspectives with the same evidence and both using the Hill Causal Criteria (Weed 1997) (see section 3.7.1). In general, this approach for decision under ignorance reveals the divergence and overlap of differing perspectives on the same evidence. The Hill Causal Criteria were described by Hill (1965) as providing different scientific perspectives on causality, with particular reference to causality in human health. The approach proposed explicitly points out the divergence and convergence in preferences of the evidence that is used to meet the Hill Causal Criteria, such that a dialogue can take place (see Table 5.1).

In risk assessment, the theoretical framework (i.e., the hazard identification and dose-response relationship) allows for reflection on a particular chemical toxicant exposure scenario, the analysis of particular chemicals within the complex mixture of 70,000 industrial/man-made chemicals. Our theoretical perspective allows us to pull individual chemicals from the background sea of 70,000 industrial/man-made chemicals. For example, the overlap in mechanistic information for dioxin, nicotine, benzene and microcystin (forming DNA adducts, interference with signal transduction) (see section 3.5) allows us to focus on these chemicals from the "sea of 70,000".

Not all toxicants will have evidence for each of the Hill Causal Criteria. We ask ourselves: with the perspective that we could develop, through the process described in this chapter for reaching decisions, which exposures warrant health advisories? The theoretical perspective and the exposure assessment perspective are compared with respect to corresponding doses of toxicant. When there is a significant amount of theoretical scientific information at the doses of concern in the environment, then these cases are presumably more certain. A problem arises when the toxicants are present at low doses in the environment and the theoretical information has been obtained with much higher doses.

Perhaps the most serious problem is the multi-factorial nature of disease and the reality of the complex exposure to thousands of chemicals. An exposure may appear innocuous if considered on its own, but in the presence of other chemicals it may be more detrimental.

The additional problem is that the background concentrations found in the environment are from a large number of sources where each individually does not contribute significantly. The source of the contaminants in fish, for example, toxaphene, DDT or PCBs, is a result of "insignificant emissions" over several years, and not from one immediate source in a single community.

5.4 Ethical Reflection: Socrates' Principles of Fostering Autonomy and Non-maleficence/ Beneficence

In considering the ethical dimension in developing health advisories, the ethical content of the scientific evidence is given by reflection on the ethical principles, in particular Socrates' principles of fostering autonomy and non-maleficence/beneficence.

Health advisories can be thought of as ranging along a spectrum. At one extreme, "one to one" causal relationships, the weighting of beneficence/non-maleficence is greater than fostering autonomy, where public health providers may decide to ban a toxicant. At the other extreme is one chemical involved in "many to many" causal relationships where the weighting of beneficence/non-maleficence is greater than fostering autonomy and contaminants may not be discussed explicitly with the public because: (1) the risks are not large enough and the communication may cause more harm than good, or (2) there are too many chemicals, the sea of 70,000 industrial/man-made chemicals. In both of the two extremes, the principles of non-maleficence (do no harm) and beneficence (promote the good) outweigh that of individual respect for autonomy (and perhaps indirectly fostering autonomy).

Accordingly, public health is inherently "weakly paternal or parental" at one extreme. How can anyone realistically think about 70, 000 industrial/man-made chemicals? Non-maleficence means the need to not overwhelm the public with risk information. At the other extreme, public health is "strongly paternal or parental". This is the case of acute toxicants where a person may die immediately from exposure. At this pole, non-maleficence means removal of the toxicants so that we cause no harm. Again, at these two poles, arguably the weight of the principles of beneficence and non-maleficence are stronger than that of fostering autonomy.

However, in the case of acute exposures, it is necessary that people understand the risks such that they do not unknowingly expose themselves, whereby fostering autonomy is arguably as strongly weighted as beneficence and non-maleficence (see section 3.4.2).

Between these two poles, the weight of the ethical principles is not certain and is contingent upon the scientific evidence, upon the particular circumstances in the communities, and the action that members of the public can realistically take. This must be considered and should shape the ethical content of risk decisions to a large degree.

Health advisories with the public generally occur through one-way channels such as newspapers, radio, television or signs on packages. The most important characteristic of one-way communication is that the public does not have the opportunity to question the risk communicator about the contents of the message. Likewise, the risk communicator does not have the opportunity to qualify or explain any of the risk statements. Thus, analysis of the risk message must be evaluated only on the specific content of the message.

Tobacco Health Advisories

Have the ethical principles been considered in the risk communication that has been developed for tobacco usage and risk of ill health? Tobacco products, made for sale in public markets, contain a risk message to inform the public of the health risks from use of the product. There are various messages and they generally state, "Smoking Kills, Smoking Causes Lung Cancer, Smoking Causes Heart Disease, Smoking During Pregnancy Can Harm the Baby, or Smoking Causes Reduced Life Expectancy".

What are the shortcomings of the message? The message does not give any information on why smoking is related to cancer or any specific chemicals in tobacco smoke that cause cancer. The message should say: Carcinogenic chemicals in tobacco smoke cause cancer. It does not give any indication of the quantity of cigarettes that are needed to be consumed to produce the ill health effect. The smoking message does not contain any qualifiers, for example,"Smoking for 25 years will cause cancer", or "Smoking one cigarette a day is not harmful."

The message also does not give any indication of individual risk, in the form of individual genetic disposition to cancer risk from smoking. There are many people in the population who do not develop cancer from smoking as is supported by anecdotal stories of people smoking for a lifetime and not developing cancer. The smoking message does not reflect individual variation in risk susceptibility (possibly genetic) in the whole population (though these, currently, are unidentifiable). Therefore, the message is directed at all people who smoke and considers everyone who smokes to be equally at risk.

The message could be considered maleficent, having the intention of scaring smokers with predictions of certain ill health. It can easily be conceived as having been designed to generate feelings of fear and guilt for harming children and others' health as an incentive to quit smoking. If this were the case, the message could be understood as strongly paternalistic as well because it does not give the information needed to evaluate the statement.

Alternatively, the primary purpose of these messages could be interpreted as being designed to inform tobacco users of the risk of cancer and related health effects from consuming the product. The message therefore could be interpreted as beneficent in primarily attempting to prevent harm, remove harm, and promote good health.

The message could be viewed as promoting the "stand alone" principle of autonomy, allowing the individual the choice to accept the identified and stated health risks from consuming cigarettes. If the message provided some mechanism for obtaining more information for those who would like to assess the evidence in greater detail, the message could be more readily interpreted as fostering autonomy. For example, a toll free number would serve to link risk communicators and the smokers in a relationship with the potential for dialogue. As it is, the prime ethical consideration is clearly not one of fostering autonomy, at best, autonomy is simply assumed.

Considering the certainty in the risks from smoking, risk managers have an obligation to warn people of the risks from smoking, to act beneficently in developing messages that warn of smoking hazards, and to encourage people not to smoke; this should not be considered an encroachment on individual autonomy, but an opportunity to foster autonomy.

Alcohol Health Advisories

There are no health advisories for alcohol and this is surely maleficent. There is a significant amount of scientific evidence that suggests that alcohol causes cancer and birth defects and therefore an health advisory is warranted (see section 3.7). The ethical discussion developed for tobacco health advisories can be applied to alcohol. However, the principle of fostering autonomy needs special consideration because in general people do not presently reflect sufficiently on the health risks from alcohol, as a consequence of the absence of health advisories. Perhaps people, the public and public health providers, need Socrates the gadfly to pester them and wake them up to the health risks posed by alcohol.

Alcohol has many characteristics that are similar to tobacco and thus the ethical concerns are related. Alcohol is well known in the community, and perhaps there is no real danger in alarming people by simply mentioning its presence, or that alcohol causes cancer. Exposure to alcohol is part of our culture, and drinking has been a part of almost all social occasions since the ancient Greeks. There is a need to communicate the dose-response relationship and the lag time for the ill health effects such that people can learn how much alcohol can affect them.

Toxaphene Health Advisories

Health advisories for toxaphene are at the other extreme from alcohol and tobacco: the health effects that may result from toxaphene are not well known and there is very little epidemiological evidence. The ethical dilemma is complicated in that toxaphene exposure does not result from a desire to consume. Rather, it is present as a contaminant in food. Furthermore, toxaphene is not a part of general community knowledge and therefore discussing its presence may cause detrimental reactions in the community. This has happened in health risk communication for mercury in fish in Grassy Narrows, Ontario (see section 3.8.2.2). For cases such as these, the communication must be far more sensitive, and one-way communcation methods, like that for tobacco and alcohol, are not appropriate.

In cases like toxaphene, where there is great uncertainty, in the north, health advisories are not currently being issued, because of the concern of "over" alarming the people (Indian and Northern Affairs 1997). To cope with the problem, communication about the presence of contaminants is taking place through education of community groups, where people can ask questions and discuss their concerns. Health risk communication is taking place along the lines discussed in section 4.7.2.2, with public health providers exploring the boundaries of people's knowledge with them, helping them understand the contaminants in an environment that meets their particular needs. People are able to ask questions to try and develop an understanding of the contaminants.

Even though sensitive communication techniques are being used, this does not mean that the issues are easier to discuss, or that people are not overly alarmed. This approach allows for a tension between the "right to know" with the right to say "I've heard enough for now" (see section 3.8.3). As a person becomes more comfortable with the scientific information, more aware, they can request more extensive information.

This requires that the approach with the public begins at a level where people can enter the dialogue.

5.5 Conclusion

The proposed process meets the needs outlined by Bates (1994) for ethical health risk communication for environmental health risks. Bates suggested a three stage process much like that outlined here following Rawls' approach for decision under ignorance, but with the stage of public explication added as necessitated by the concept of relational ethics. The process may function well in discussing health risks with community groups, and to facilitate an understanding of risk assessment.

Public health practitioners can approach the public with a decision map, showing how decisions are being ethically reflected upon. The historical cases, developed along the lines begun in this chapter, may help provide context for the public to assess the treatment of new cases. The practical application of the approach with respect to the public still may be very difficult to employ. In the end, ultimately the approach may be expected to help with public health deliberations and risk taking.

Will this type of approach lead to better advisories even if they are theoretically ethical health advisories? We will not know until we try. However, it is quite clear from the risk communication literature that, to a large extent, there needs to be a "cultural broker" to help the public and risk managers with understanding the risks and facilitating communications between the public and risk managers. Following Socrates, this is the role of public health risk communicators: helping people to become involved as citizens in environmental health questions. From the perspective of fostering autonomy, the goal of health risk communication is the flow of meaning and not the dissemination of information. With this in mind, we can think of the overall process as a means to develop knowledge through the experience of risking, and to create the opportunity for existential knowing between risk managers and the public.

Table 5.1 Hill's Causal Criteria for establishing causation

1. Strength of Association - What is the relative difference of effects between groups exposed and not exposed?
2. Consistency - Has there been a repetition of the circumstances and observations?
3. Specificity - What are the specifics of the cause and effect: "one to one", "many to many" relationships?
4. Temporality - Does the cause precede the effect?
5. Biological Gradient - Is there a dose-response relationship between cause and effect?
6. Plausibility - Is there biological knowledge of the relationship between cause and effect, a mechanistic understanding?
7. Coherence - Is the result consistent with known natural history and biology of the disease?
8. Experiment - Can the cause and effect relationship be tested experimentally?
9. Analogy - Is the cause and effect relationship similar to other known relationships?

5.6 References

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Note: See section 3 for the references on the specific toxicants.

Chapter 6. Conclusion of Ethics In Public Health Risk Communication

6.1 The Need for the Study of Ethics in Public Health Risk Communication

6.1.1 There is a need for ethics in public health risk communication. The need for ethics has long been recognized and accepted in medicine and, more recently, in public health practice. The thesis argues that the need is just as strong in public health risk communication in particular. The need is shown primarily through the analysis of the public health literature in Canada and the actions of public health practitioners in Canada.

6.1.2 In Health Canada's (1996) *Health Risk Communication Handbook* the word ethics does not appear in the text. In *Maxcy-Rosenau-Last: Public Health and Preventive Medicine* (11th to 13th editions) there is no discussion of ethics and health risk communication. However, there is a brief introduction to biomedical ethics (section 1.2).

6.1.3 Pellegrino (1993) suggests that the emergence of bioethics resulted from the questioning of Hippocrates' medical tradition in the early 1960s (section 2.2). A deliberative model for healthcare relationships emerged, based on the "double process" of Plato's medical model (Emanuel and Emanuel 1992) (section 2.6.3). This opened the door to the ancient Greeks and the study of Socrates. The synchronous emergence of Hippocrates and Socrates in the recent health literature brought up the whole question of, "How we got here?". What was so wrong about Hippocrates and right about Socrates? Why did the Hippocratic model survive?

6.2 The Root of Public Health - Socrates

6.2.1 The "public health perspective" is that the public health practitioner first sees and "*knocks on the door of the public*" (Howell 1996, section 1.1). In contrast, in medicine, the public first sees and "*knocks on the door of the healthcare provider*". The root of public health can be found in the historic Socrates (470-399 B.C.). Socrates' office was the community streets, "knocking on the door of the public to learn" (section 4.2).

6.2.2 From Socrates, ethics can be understood as an affective attitude that shapes healthcare relationships. Ethics requires a reflection on the here and now, as the facts of matter are empty (section 4.3, and section 5.1).

6.2.3 Socrates can also be seen as a root of the scientific approach (Chapter 3). Socrates' mother, Phaenarete, was a midwife (section 4.3). The midwife maxim is that knowledge requires experience, and knowing is through directed operations. Socrates' perspective is that theory provides the "glasses to see" in both science and ethics (section 3.2.2). Subsequently, hypotheses have been distinguished as testable ideas. Theory develops through refutation and reproducibility of hypotheses. We learn through the errors of existence. There is a need for creative insight.

6.2.4 Socrates' three principles of ethics are (1) think for yourself - fostering autonomy, (2) promote the good - beneficence and (3) do no harm - non-maleficence (section 3.1, section 4.3). Fostering autonomy is different from the principle of "respect for autonomy" in the principle-based bioethics literature. Fostering autonomy can be thought of as care for the self in body and mind. Socrates' principle is a "process of becoming", a person-specific approach to help people develop the ability to reflect on their lives and decisions. Socrates provided motivation to care for the self through the example of his own life. The root of the concept of relational ethics is arguably Socrates.

6.2.5 The concept of risk has been developed from considering Socrates' risk perspectives (section 4.4). A deliberative conception of risk has been distinguished with the question: What is the risk X? Deliberative risk is a noun, abstract expectations of future pains and pleasures, hopes and fears. An existential conception of risk has been distinguished with the question: What does it mean for me to be risking X? Existential risking is a verb, an active process referring to "risking as gambling" and learning through experience or science.

6.2.6 Socrates' risk education method was developed through the deliberative and existential perspectives (section 4.7.2.2). The deliberative education maxim is: Let's conduct the children to war on horseback to be spectators. The existential education maxim is: wherever it may be safe, bring them to the front and give them a taste of the blood.

6.2.7 Socrates provides advice in seeking a "good risk advisor" in that the words and deeds of the risk advisor must be in harmony (section 4.7.2.1). Further, the risk advisor must be able to give an account of their words and deeds.

6.2.8 I argue, in keeping with Heidel (1941), that Hippocrates of Cos the person is in keeping with Socrates (section 3.1; sections 4.5 and 4.6). The recent scholarship in bioethics has developed as a challenge to the Hippocratic tradition. However, I cast doubt on the idea that our problem is with the Hippocrates of Cos, the person. I suggest, in keeping with Jones (1923), that the problem with the Hippocratic corpus develops after Hippocrates of Cos and in the terms of Plato, that the problem is the technical mask, the profession of knowledge and wisdom (section 4.6.2).

6.3 The *Canadian Journal of Public Health* Ethical *Desideria* - The Words

6.3.1 The first voluntary public health group in Canada began in 1875 with the Citizen's Public Health Association (Heagerty 1928) (section 1.5.1). The aim of the association was the diffusion of knowledge, risk communication, and the primary goal was stated to be *prevention*, not cure. This group developed into the Canadian Public Health Association, with the corresponding journal, the *Canadian Journal of Public Health*.

6.3.2 In 1929, Hague argues for persuasion, not coercion, in public health risk communication and decision-making i.e., against manipulation (section 1.5.2).

6.3.3 In 1930, Douglas argued that we advocate no unsound theories, as there is much mis-information in health risk communication. This is the principle of non-maleficence or "doing no harm" (section 1.5.2).

6.3.4 In 1936, Bates suggests that we are all aware of the value of publicity to the "charlatan" who desires to sell his wares and unquestionably this type of publicity has done a great deal of harm. He thinks that to a certain extent that day has passed and now considerable public health education of a legitimate character is being carried on through the press which may be calculated to do a great deal of good. Bates says that there is no doubt that while so called ethical considerations have been a hindrance in many directions in the past, the main consideration then, on the whole, was held to be the greatest good of the greatest number (section 1.5.1).

6.3.5 In 1943, Mathew suggests that we need a contextual approach to health risk communication, which means that we need to understand the public viewpoint (section 1.5.3).

6.3.6 In 1949, Bladen suggested a personal approach to risk communication, that we must understand the "feelings" of the public and their cultural viewpoint (section 1.5.3).

6.3.7 In 1960, Rosen argued that we cannot impose values on the public as values are expressed through culture. We need to influence change that is acceptable to the individual or group. This approximates the principle of "respect for autonomy" (section 1.5.4).

6.3.8 In 1966, Szasz said that we need to think of health as a goal which is best suited to reach the goals which individuals formulate for themselves. This is a person-specific approach to health, where health risk communication means helping people formulate their health goals. This approximates the principle of "fostering autonomy" (section 1.5.4).

6.3.9 In 1960, Dansereau argued that science is "no sacred cow". Dansereau says, of the moral consequences, that science must refuse any special competence or special responsibility. Further, let us not advocate a technocratic power as we have a theocratic or aristocratic one in the past. Dansereau's comments stem from concerns over nuclear risks, and suggests a democratic approach to risk problems (section 1.5.4).

6.4 The *Canadian Journal of Public Health Risk Communication* - The Deeds

6.4.1 Basic Causal Framework to Examine Deeds

6.4.1.1 My examination specifically discusses the issue of health advisories in relation to scientific knowledge, primarily for tobacco smoke, nutrition, alcohol and toxaphene, a chemical contaminant in fish. A framework for analysis of risk based on causal relationships was developed: a) "one to one", i.e., acute effect, hemlock poison; b) "one to many", i.e., alcohol: liver, p450IIE, FAS; c) "many to one", i.e., production of a cancer cell; d) "many to many", i.e., nutrition, smoking: thousands of chemicals: thousands of effects (section 3.1).

6.4.1.2 "One to one" causal relationships were not discussed historically from the literature in the *Canadian Journal of Public Health* (section 3.1). There was not a significant historical line perhaps because public health has been very effective in preventing these types of risks. In "one to one" relationships death occurs immediately; for example, Socrates' death from hemlock poison, and saxitoxin in shellfish. The ethical attitude in "one to one" causal relationships is the prevention of death (section 3.4). This entails fostering autonomy, "waking people up" to the risks and beneficence/non-maleficence over individual autonomy (strong paternalism or parentalism) to remove the risks from the environment. The problem for chemicals like saxitoxin is that we cannot remove them from the environment, as we cannot ban nature.

6.4.2 Tobacco Smoke in the *Canadian Journal of Public Health* - 2,000 Chemicals (section 3.6)

6.4.2.1 In the 1860s, tobacco cigarette manufacture began, although aboriginals had grown tobacco previously.

6.4.2.2 The *Canadian Journal of Public Health* presents evidence on the relationship between tobacco smoke and disease very early in the century (section 3.6.1). In 1929, McIntosh argued that tobacco smoke causes lung cancer. In 1932, McCullough reported that cancer mortality increased from 69.4 to 109.5 per 100,000 from 1914-1930 and suggested that tobacco and alcohol are the lines of prevention. In 1933, Bloodgood suggested that people could smoke tobacco safely through brushing their teeth. However, in 1934, MacKlin noted that lip and mouth cancer increased ~10x in women from 1900 to 1930. She observed that women do not smoke pipes and therefore tobacco causes cancer, not the hot pipe stem.

6.4.2.3 In 1947, McKinnon showed that between 1921-1947, lung cancer mortality accounted for one-quarter to one-half of all increases in male cancer. However, the increase was argued to be attributable to *improved diagnosis*. There was no mention of smoking as a causal factor and no discussion of *prevention* of lung cancer by refraining from smoking.

6.4.2.4 In the early 1950s, the famous tobacco studies showing the relationship between smoking and lung cancer were published: Wynder and Graham (1950) in Journal of the American Medical Association; Levine et al. (1950) in Journal of the American Medical Association; Schrek et al. (1950) in *Cancer Research*; Miller and Porter (1950) in *Cancer Research*; Doll and Hill (1952) in the *British Medical Journal*; and Doll and Hill (1954) in the *British Medical Journal*. Contributions to the *Canadian Journal of Public Health* did not comment on these studies.

6.4.2.5 In 1954, Phillips published results from lung cancer mortality 1921-1952 in the *Canadian Medical Association Journal* and found an increase from 3.0% to 13.4% of all cancer deaths. In 1957, Phillips published an editorial in *Canadian Journal of Public Health* saying there is considerable doubt in the study results because poor accuracy in death certificates and *improved diagnosis*. Phillips did not mention smoking as a causal factor and did not discuss *preventive* measures. Phillips did not comment on the results of the famous studies.

6.4.2.6 In 1958, Godden was the first to mention smoking since 1934, when McKlin suggests smoking causes cancer. Godden says: "Like a championship chess game the tobacco controversy develops a series of moves and counter moves....". From this paper, and in recognition of the ongoing public health risk games, I develop the concept of *chess* *advisories*. This term, chess advisory, can serve a symbolic meaning of the ethical problems in public health.

6.4.2.7 In 1964, the *Canadian Journal of Public Health* officially stated that smoking tobacco causes lung cancer and there should be health advisories to warn people of the risks of smoking (Defries 1964).

6.4.2.8 Why was there no *prevention* of smoking? Why was there no "knocking on the door of the public"? Why was there no mention of the tobacco "risk game" until 1958? As Socrates suggests, in the case of smoking tobacco, the words and the deeds are not in harmony. Let's pull the masks off and have an accounting of the words and deeds! Who is playing the "risk game" for the public? Why have they not spoken?

6.4.3 Alcohol, Cancer, Breast Cancer and Birth Defects (section 3.7)

6.4.3.1 In 500 B.C., Socrates, Hippocrates and Plato argue that alcohol causes health and social problems; in particular, birth defects. They note that alcohol also causes positive health effects: it is good for the heart, good for the flame, and helps the dialogue flow.

6.4.3.2 In 1932, McCullough presents the cancer mortality increase 69.4 to 109.5 per 100,000 from 1914-1930, and that tobacco and alcohol are the lines of prevention. In 1948, an editorial appears for the first time suggesting alcohol is a social problem.

6.4.3.3 In 1949, McKinnon presents the historical trend in breast cancer (1909 -1947) (section 3.7.1). McKinnon says that breast cancer is the only major cancer that can be read with any degree of confidence. The increase in the rate "in all ages" in 1920 was because certification began. Since that time, there has been a steady increase in rates only for women over 70.

6.4.3.4 In 1980, Doll and Peto argue that tobacco smoke and alcohol are the two largest causes of cancer, having a synergistic effect. They suggest that dietary fat is also a major cause of cancer.

6.4.3.5 In 1989, Schmal et al. (1989) challenge the Doll and Peto "causes of cancer"; in particular Doll and Peto's claim that the cause of 97% of cancers are known. They quote Doll in the conclusion saying that establishing the dietary fat link to cancer has been extremely frustrating and inconclusive (Schmahl et al. 1989).

6.4.3.6 On November 18, 1989, all alcoholic beverages in the United States display the message: "Government Warning: According to the Surgeon General, women should not drink alcoholic beverages during pregnancy because of the risk of birth defects".

6.4.3.7 In 1990, Smart, in the *Canadian Journal of Public Health*, argues that there is a reluctance to place an health advisory on alcohol unless industry voluntarily agrees. The advisory was warranted for birth defects and cancer (section 3.7.2). Smart suggests that we place a health advisory on alcohol; at the very least, for symbolic value.

6.4.3.8 More recently in Canada, the increase in breast cancer incidence has been ~1.5% per year in women over 50 since 1980. By comparison is the U.S.: between 1940-1982 in Connecticut, the increase has been 1.2% per year, and between 1982-1986 in all of the U.S., 4% per year (section 3.7.1).

6.4.3.9 In 1993, Colditz reports a relationship between the risk of breast cancer and alcohol intake from a study of 90, 000 nurses (section 3.7.1). There is a dose-response relation: relative risk is ~ 1.3 for 5-14g/day (95% C.I. 1.0-1.6) and 1.6 for 15 g/day (95%

C.I. 1.3-2.0). However, for the theoretical low risk group of 20, 000 nurses, the relative risk is 2.5 for 15g/day. Dietary fat is shown not to be a causal factor. The relative risk among women in the highest quintile of total fat intake compared with women in the lowest quintile is 0.82 (95% C.I. 0.64-1.05).

6.4.3.10 In 1994, Longnecker conducted a "meta-analysis" of 50 studies of alcohol and breast cancer and found a shallow dose-response relationship suggesting 2 drinks per day means a 25% increase in relative risk of breast cancer (section 3.7.1). The relative risk of 26 grams of ethanol relative to nondrinking is 1.24 (95% C.I. 1.15-1.34). There is a long-term increase in the incidence from 82.4 per 100,000 in 1973 to 104.6 per 100,000 in 1989. Among American women, 40-55 years of age, breast cancer is the leading cause of death. Further, the dietary fat-breast cancer hypothesis is not substantiated in agreement with studies on nurses dating back to 1987.

6.4.3.11 In 1994, Loney argues against the fact that there is still no advisory on alcohol products in Canada, not even to warn women who are pregnant that alcohol can cause fetal alcohol syndrome and birth defects (section 3.7.2).

6.4.3.12 When should public health "knock on the door of the public" and try to prevent diseases related to alcohol? When should the public get in on the "alcohol risk game"? Is this the same "risk game" as we saw with tobacco? Is history repeating itself? We should avoid an "either/or" position for dietary fat (as is often the case in "causation" arguments), as the dose-response relationship for alcohol is shallow, suggesting there are other factors operating. What new factors have emerged in the last few years to cause the increase in incidence of breast cancer? What new factors could be operating in conjunction with alcohol, possibly through the estrogen mechanism, as we have been drinking alcohol for many years?

6.4.4 Toxaphene and Chemical Contaminants in Fish (section 3.8)

6.4.4.1 In 1946, Baillie suggests that there are no cases of DDT toxicity in humans and it is quite safe for use if safety precautions are taken (section 3.8.1).

6.4.4.2 In 1950, Kay argues that "DDT and its analogs are stored in considerable quantities in animal fat and excreted via the mammary route" and further that chlordane, toxaphene, and methoxychlor are higher in toxicity than DDT.

6.4.4.3 In 1960, the presence of contaminant chemicals, like DDT, are found in human breast milk and adipose tissue (Read and McKinley 1961).

6.4.4.4 In 1972, DDT is banned by the U.S. E.P.A. as a probable carcinogen and its use replaced by toxaphene (Saleh 1991).

6.4.4.5 In 1982, toxaphene is banned by the U.S. E.P.A. as a probable carcinogen.

6.4.4.6 In 1989, Labonte notes an increase in pesticide use in Ontario of 59% from 1973 to 1983, with a corresponding 56% increase in the quantity of pesticides used per hectare of cropland, and that global pesticide use increased 1,300% between 1945 and 1980.

6.4.4.7 Toxaphene has been spread all over Canada as a result of the abundant use; approximately 1,330,000 metric tons have been used world wide (ATSDR 1994).

6.4.4.8 In 1997, Chan et al. present a "monte carlo analysis" in *Environmental Health Perspectives* showing that the contaminants in fish above "guideline values" in Canada are mercury, toxaphene, chlordane. These are Kay's toxicants identified to concentrate in the fish and wildlife in 1950.

6.4.4.9 Why was DDT replaced with toxaphene in 1972, considering the data presented by Kay in 1950 (section 3.7.2)? The problems we are now facing from contaminants in the environment were identified almost immediately by Kay and have been documented throughout the history of pesticide use in the *Canadian Journal of Public Health*. However, there has been no mention of toxaphene in the *Canadian Journal of Public Health* since Kay in 1952, possibly because it was only detected in the late 1980s when analytical techniques developed. Still, tons of toxaphene have been knowingly released to the environment. Thus, did we knowingly pollute the environment with toxicants that we knew would concentrate in the fish and wildlife, in human adipose tissue and in women's breast milk? What is the argument for these actions that goes against the evidence in the *Canadian Journal of Public Health*? Who is public health playing "risk games" for? How do they make risk decisions? Where is the *prevention*? Who is "public health"?

6.5 How Do We Proceed From Here?

6.5.1 The key problem is that there are approximately 70,000 industrial/man-made chemicals identified in the environment (section 3.2.3). Who can think about all of these chemicals, assimilate all of the information, and calculate the possible combinations of chemicals that play a role in human health? Thus, public health is inherently weakly paternal or parental, which means non-maleficence and beneficence need to be considered along with respect for autonomy.

6.5.2 To mitigate the problems encountered with tobacco smoke and alcohol, we should develop *chess advisories* such that we can involve the public in the "risk game" earlier, to participate in environmental health risk decisions (section 3.6.1). A framework for risk decision-making *under ignorance* is presented as a starting point to develop both *health advisories* and *chess advisories* (Chapter 5). The name *chess advisory* may also serve as a symbol, a reminder of the very disturbing history of the tobacco risk game played in Canada. This symbolic value is needed, arguably, as history is repeating itself right now with respect to the risk game involving alcohol, dietary fat and the increase in the incidence of breast cancer.

6.5.3 As the risks posed by chemicals in the environment are complex, and the communication has been shown to harm communities and overwhelm people, we need to develop health risk communication methods that hold in tension the "right to know" with the right to say "I've heard enough for now" (section 3.8.2.2).

6.5.4 A substantial amount of evidence suggests that eating fruits and vegetables prevents cancer, in contrast to the widely spread message that diet causes cancer and, in particular, the claim that natural toxins in fruits and vegetables cause cancer (section 3.6.2). There does not appear to be a "magic bullet" nutrient that prevents cancer. The new public health motto could be: "Eat a peach or carrot with every smoke to try and mitigate the risks". This message does not advocate eating fruits and vegetables as an alternative to quitting smoking. Quitting smoking is the most certain means of preventing the risks from tobacco smoke.

6.5.5 We need to be aware that there is a need for ethics in public health risk communication. Some people, public and risk managers, may take point 6.5.4 to imply that if they eat fruits and vegetables every day, they can smoke and drink without risking their health, and expose themselves to harmful cancer causing chemicals more generally without risks. Indeed, we are in a risk culture; the seeds of destruction are sown with the seeds of good intentions.

6.6 References By Section

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